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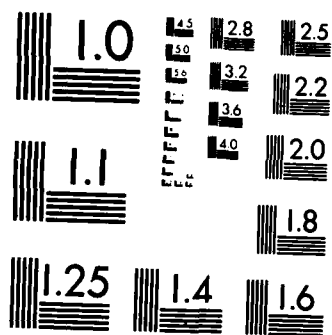
FINAL ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT  
STATEMENT CULLINAN. (U) CORPS OF ENGINEERS SAN  
FRANCISCO CA SAN FRANCISCO DISTRICT MAY 84

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**FINAL  
ENVIRONMENTAL IMPACT REPORT /  
ENVIRONMENTAL IMPACT STATEMENT**

**CHAPTER 11: APPENDIX IV**

**CULLINAN RANCH**

**City of Vallejo  
U.S. Army Corps of Engineers**

**May 1984**

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. <b>A141074</b>	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Final Environmental Impact Report/Environmental Impact Statement, Cullinan Ranch Specific Plan		5. TYPE OF REPORT & PERIOD COVERED
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Environmental Impact Planning Corporation San Francisco, California		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Corps of Engineers, San Francisco Dist. 211 Main Street San Francisco, California 94105		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Office of the Chief of Engineers U. S. Department of the Army Washington, D. C. 20314		12. REPORT DATE May 1984
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18. SUPPLEMENTARY NOTES - Prepared in cooperation with the City of Vallejo Planning Department Solano County, California - Appendices are bound in a separate volume		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Environmental Impact Excavation/Fill Waterfront residential/commercial development Recreational Boating		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Joint State/Federal environmental impact document concerning a regulatory permit application by Pan Pacific and Redwood Realty under Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act. The proposed project involves a water-oriented predominantly residential community with public and private marina facilities.		

## APPENDICES

- IV. N. Addendum to the  
RMA/Krone Report,  
August 1983



Acquisition For	
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ARMY	<input checked="" type="checkbox"/>
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## APPENDIX A

Beneficial Impacts of the Proposed Cullinan Ranch Development, prepared by W.R. Williams, Inc. (developer), December 1983

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**BENEFICIAL IMPACTS OF THE PROPOSED  
CULLINAN RANCH DEVELOPMENT**

- 1) The proposed project will provide increased housing opportunities for local and regional bay area residents.**
  - Current housing shortages would be reduced by the addition of 3000 single family residences and 1500 multiple family residences over a 15 to 20 year period.
  - A wider range of housing opportunities would be provided for moderate to higher income households in the local Vallejo area.
  - The proposed housing units would be of moderate price value compared to similar residential marinas - with an average sales price of \$215,000 for single family residences and \$145,000 for multiple family residences.
  
- 2) The proposed project will provide increased recreational boating opportunities for local and regional bay area residents.**
  - Proposed marina facilities would provide some 600 to 700 berthing spaces with expansion capabilities of up to 500 additional spaces depending on future public demands.
  - The size and configuration of the main channel area has been designed to maximize sailing opportunities within the boundaries of the property.
  - In addition to the boating opportunities created within the interior of the property, the project will offer open deep water access to the Napa River and the San Francisco Bay and Sacramento regions.
  
- 3) The proposed project will serve to increase the total water area and shoreline connected to the bay.**
  - In keeping with the Bay Area Plan, some 400 acres of open water area will be added by the project, including 17 miles of additional shoreline.
  
- 4) The proposed project will serve to increase public access to the bay and other open space features.**
  - The proposed plan offers a large variety and amount of open space, including open water areas, improved wildlife habitats, community and neighborhood parks, landscaped buffer areas, bicycle/pedestrian corridors, etc.
  - The amount of open space designated by the proposed plan, including both land and water areas, comprises over one-

half the total area of the property (823 acres of the total 1493 acres).

- Public access to such open space would be provided by means of the proposed street system, public parking areas, bicycle and pedestrian trails, public parks, specialty commercial facilities and public recreational boating facilities.
  - The proposed bicycle and pedestrian trail system alone extends a distance of some 13 miles and provides direct public access to approximately 10½ miles of shoreline within the boundaries of the property.
- 5) The proposed project will result in increased park and recreation facilities beyond those required by the City and Park District.
- City and Park District standards would require some 50 acres of park space and recreation facilities, while the development plan proposes to provide 95 acres of park and recreation facilities.
  - The facilities will include a 20 acre community park, two neighborhood parks totalling 13 acres, a 10 acre marina park, various view parks totalling 15 acres, and a bicycle/pedestrian corridor covering some 37 acres.
  - These facilities would be available for use by the general public, including existing and future residents of Vallejo.
  - The developer is required to provide the necessary funds and/or improvements to establish such facilities and revenues from the development will provide sufficient funds for on-going maintenance without burdening existing residents.
- 6) The proposed project will provide all necessary school improvements to serve the development.
- The proposed plan includes two elementary school sites and one junior high school site to serve that portion of the school age population generated by the project.
  - The development will provide all funds and/or improvements necessary to construct the elementary and junior high school facilities.
  - Additionally, the developer will pay impact fees or provide additional improvements off-site as necessary to expand existing high school facilities to serve the proposed project.

- The school district will receive sufficient funds from the State under current funding formulas to meet on-going operating costs created by the project without burdening existing residents.

**7) The proposed project will provide all necessary street improvements, utilities and sewage treatment facilities to serve the development.**

- The developer will be required to pay all capital costs for the expansion and improvement of utilities, roadways and sewage treatment facilities necessary to serve the proposed project.
- All on-going costs for the operation and maintenance of such facilities will be paid for by projected revenues from the project without burdening existing residents.
- The project is projected to generate significantly higher annual public revenues than annual public costs to the benefit of existing residents.

**8) The proposed project will serve to protect and enhance the existing water quality of the area.**

- The project will result in enhanced tidal flows and flushing action within the adjoining sloughs and the Napa River for improved water quality.
- During construction, each phase of development will be separated from open water areas by a system of coffer dams and the excavation work all performed "in the dry" to maintain water quality.
- Near the middle of the construction period, tidal gates will be installed to permit tidal flows from the adjoining sloughs to enter the project area so as to maintain desirable water quality.
- The project will also provide a 90-acre site on the property for the disposal of dredge maintenance materials from internal waterways of the project. The site would have the capacity to accept dredge maintenance materials for some 80 years.
- Additionally, boating regulations, various holding and collection facilities, fuel dispensing facilities and routine maintenance operations will be provided in such a manner as to minimize potential pollutants from boating activities.

- Potential pollutants from on-shore activities will be minimized by the enforcement of existing zoning regulations, restrictions on the use of fertilizers and pesticides, the use of catch basins and filter traps in drainage systems, routine maintenance operations and similar measures.
- 9) The proposed project will result in additional improved wildlife habitat of moderate to high wildlife value.
- In consideration of proposed development, the property owner has deeded to the State of California some 200 acres of land deemed to be of equal or greater wildlife value than the Cullinan Ranch.
  - In addition, the proposed project will provide some 900 acres of improved wildlife habitat, including tidal marsh, mudflats and open water areas which are of greater wildlife value than the existing grain fields.
  - The existing high value wildlife habitats of Dutchman and South Sloughs will be preserved and enhanced by widening and planting of the levee in these areas.
  - The improved levee and adjacent boat channel will serve to provide a minimum 600 to 1400 foot-wide buffer between the proposed residential development and existing wetlands to the north.
- 10) The proposed project offers a unique marina oriented community within the Vallejo area of a quality and design which will add to the positive image of the city.
- The specific plan for the project offers extensive architectural, landscaping and other design standards to insure a high quality development.
  - The design standards are all subject to the approval of the City and will be incorporated as part of the development and zoning regulations for the property.
- 11) The proposed project will result in net public revenues over public costs to the benefit of existing and future residents.
- The proposed project, when fully developed, will create a surplus cash flow to the City of some 2.4 million dollars each year.

- The proposed project will also net surplus revenues to the City throughout each phase of construction prior to completion.
  - The County of Solano will net surplus revenues from the project on the order of 2.3 million dollars each year.
  - The beneficial impact of the proposed project is further enhanced by the fact that the developer will be required to fund or construct all necessary capital improvements at no cost to the City or existing residents.
- 12) The proposed project will serve to provide added employment and job opportunities for the building trade and related industries throughout the region.
- The first phase of construction, involving some 300 residential units, will support an average of over 500 additional jobs per year. Of that amount, an estimated 360 jobs per year would occur within the local Solano County area.
  - Over the full 20 years of project development, residential construction would support an average of 1250 additional jobs per year, with an average of some 1590 jobs being created during the peak years of construction. Of the total 1250 jobs per year, an estimated 900 new jobs per year would occur within the local Solano County area.
  - Added to the above figures which relate to residential construction only would be several hundred additional jobs created from construction of the many public works, boating facilities and various commercial facilities designated by the proposed plan.
- 13) The project will generally assist in the upgrading and development of the Guadalcanal Village property for use as a speciality commercial complex or industrial center.
- Development of the marina and the residential uses as proposed by the Specific Plan will provide a supportive market for either a speciality commercial complex or industrial center on the neighboring property owned by the City.
  - The provision of utilities and street improvements may be carried out in such a way as to facilitate the development of the Guadalcanal Village area.

14) The proposed project will lend support for local redevelopment efforts of the city and long-term increases in retail sales and industrial growth in the area.

- The future residents of the project will supply additional demands and revenues for both public and private activities within the City.
- The quality of housing envisioned by the project will also lend support for existing industry and serve to attract additional high quality industries to the area.

15) The project will assist in providing necessary street and highway improvements and help alleviate existing and projected traffic problems throughout the area.

- Traffic on Highway 37 (Sears Point Road) is continuing to increase along with related problems of traffic congestion particularly at the easterly approach to Sacramento Street between Sacramento Street and Enterprise Street.
- Such traffic congestion exists at the present time and will continue to pose problems in the future regardless of whether or not the proposed project is developed.
- The project as such will add to the traffic volumes along Highway 37, however as part of the project, Highway 37 will be widened to a minimum of four lanes to improve present and future conditions.
- The project will also assist in providing various improvements to other local streets, in particular, such streets as Wilson Avenue, Sacramento Street and Redwood Street (between Sacramento Street and Route 29).

## APPENDIX B

Determination of Corps of Engineers Section 404 Wetlands Jurisdiction on Cullinan Ranch Based on Aerial Photo Analysis, prepared by the Regulatory Actions Branch, Corps of Engineers, November 17, 1983.

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DEPARTMENT OF THE ARMY  
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS  
211 MAIN STREET  
SAN FRANCISCO, CALIFORNIA 94105

17 NOV 1983

Regulatory Functions Branch  
No. 14775E57

W. R. Williams, Inc.  
2130 Main St., Suite 230  
Huntington Beach, CA 92648

Gentlemen:

This is in response to your letter of September 30, 1983 in which you request an explanation as to the criteria and basis for any jurisdiction the Corps of Engineers may have under Section 10 of the River and Harbor Act of 1899 and/or Section 404 of the Clean Water Act as well as the method used to delineate the areas on Cullinan Ranch which are subject to such jurisdictions.

As my staff previously communicated to you, both in writing and per telephone, Section 10 jurisdiction on Cullinan Ranch was determined using the 1:24,000 Quadrangle Sheets from which the "preliminary Map of Historic Margins of Marshland, San Francisco Bay, California" (Nichols and Wright, 1971), was prepared. Section 404 jurisdiction was determined through an aerial photo analysis supplemented by limited field checking. This information was furnished to your staff and to Torrey and Torrey in early September 1983.

Your objection to the use of Nichols and Wright's Quad Sheets for Section 10 jurisdiction determination is noted. The Corps of Engineers has, however, confidence in these maps and my staff has used them since 1972. These quad sheets have also been used in court cases. A review of the "Text and References Accompanying Preliminary Map of Historic Margins of Marshland, San Francisco Bay, California", which is enclosed as Enclosure 1, explains the techniques used to prepare the maps and discusses the accuracy of the finished maps. We agree that on occasion old plane-table surveys may not be accurate in terms of the geographical reference system (i.e., the latitude and longitude may not have been correctly surveyed) but the spatial relationships, i.e., the relative location of physical and cultural features shown on plane-table surveys are usually remarkably accurate. The continued use of the Nichols and Wright's maps are justified by the fact that, to our knowledge, there are no maps that delineate the historic marshlands in the Bay with greater accuracy.

The method employed by my staff for delineating areas subject to Corps of Engineers jurisdiction under Section 404 of the Clean Water Act is straightforward. It basically consisted of establishing a limited number of wetland sample sites which were used as ground truth from which aerial photo interpretation keys were developed for subsequent use in the aerial photo analysis during which Section 404 wetlands were delineated. I am enclosing

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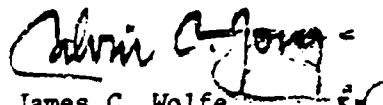
Regulatory Functions Branch  
No. 14775E57

a copy of the report (Enclosure 2) titled "Determination of Corps of Engineers' Section 404 Wetlands Jurisdiction of Lands on Cullinan Ranch Based on an Aerial Photo Analysis" which explains in more detail how the Section 404 wetlands on Cullinan Ranch were delineated.

It is true that the Project Evaluation Section would not release the Final EIR/EIS until the question of Corps of Engineers' jurisdiction over Cullinan Ranch had been established. However, such jurisdiction was established to the satisfaction of the Project Evaluation Section in early September 1983, when the information concerning the Section 10 and Section 404 jurisdictions were provided to your staff and to Torrey and Torrey, the preparer of the Final EIR/EIS. Therefore, the processing of the Final EIR/EIS has really not been delayed due to 'the confusion about Corps of Engineers' jurisdiction.' I understand that the primary reason for the delays in finalizing the EIR/EIS is contractual and not a lack of information.

If I can be of any further assistance please let me know.

Sincerely,

  
James C. Wolfe  
Chief, Construction-  
Operations Division

Enclosures

DETERMINATION OF CORPS OF ENGINEERS' SECTION 404 WETLANDS JURISDICTION  
ON CULLINAN RANCH BASED ON AN AERIAL PHOTO ANALYSIS

PREPARED BY

REGULATORY FUNCTIONS BRANCH

CORPS OF ENGINEERS

DETERMINATION OF CORPS OF ENGINEERS' SECTION 404 WETLANDS JURISDICTION  
ON CULLINAN RANCH BASED ON AN AERIAL PHOTO ANALYSIS

TABLE OF CONTENTS

<u>SUBJECT</u>	<u>Page No.</u>
I. INTRODUCTION	1
A. PURPOSE AND SCOPE OF REPORT	1
B. DESCRIPTION OF STUDY AREA	1
II. METHODOLOGY	1
A. INFORMATION NEEDS AND ASSUMPTIONS MADE	1
B. FIELD INVESTIGATION	2
C. AERIAL PHOTOGRAPHY ACQUISITION	2
D. PHOTO INTERPRETATION	2
E. INFORMATION TRANSFER AND MEASUREMENT	3
III. RESULTS OF ANALYSIS	3

REFERENCES

DETERMINATION OF CORPS OF ENGINEERS' SECTION 404 WETLANDS JURISDICTION  
ON CULLINAN RANCH BASED ON AN AERIAL PHOTO ANALYSIS

I. INTRODUCTION

A. PURPOSES AND SCOPE OF REPORT

The purpose of this report is to present the findings of a study to determine the amount of land of Cullinan Ranch that is subject to Corps of Engineers jurisdiction under Section 404 of the Clean Water Act. The study was undertaken in response to an application for a permit to develop the area to residential and commercial uses. Due to the large size of the study area and time restraints, it was decided to use aerial photographs to delineate the areas that are subject to Corps of Engineers jurisdiction under Section 404 of the Clean Water Act.

B. DESCRIPTION OF STUDY AREA

The area under investigation, which is commonly known as the Cullinan Ranch, occupies approximately 1493 acres within the City of Vallejo in Solano County. The topography of the parcel is characterized by level land, separated from San Pablo Bay by levees. The study area is traversed by a number of meandering sloughs and man-made drainage ditches. The vegetation in the study area consists of agricultural crops, such as oats and scattered areas with low terrestrial and wetland vegetation as well as few barren spots. The study area is delineated on the map presented as Plate 1.

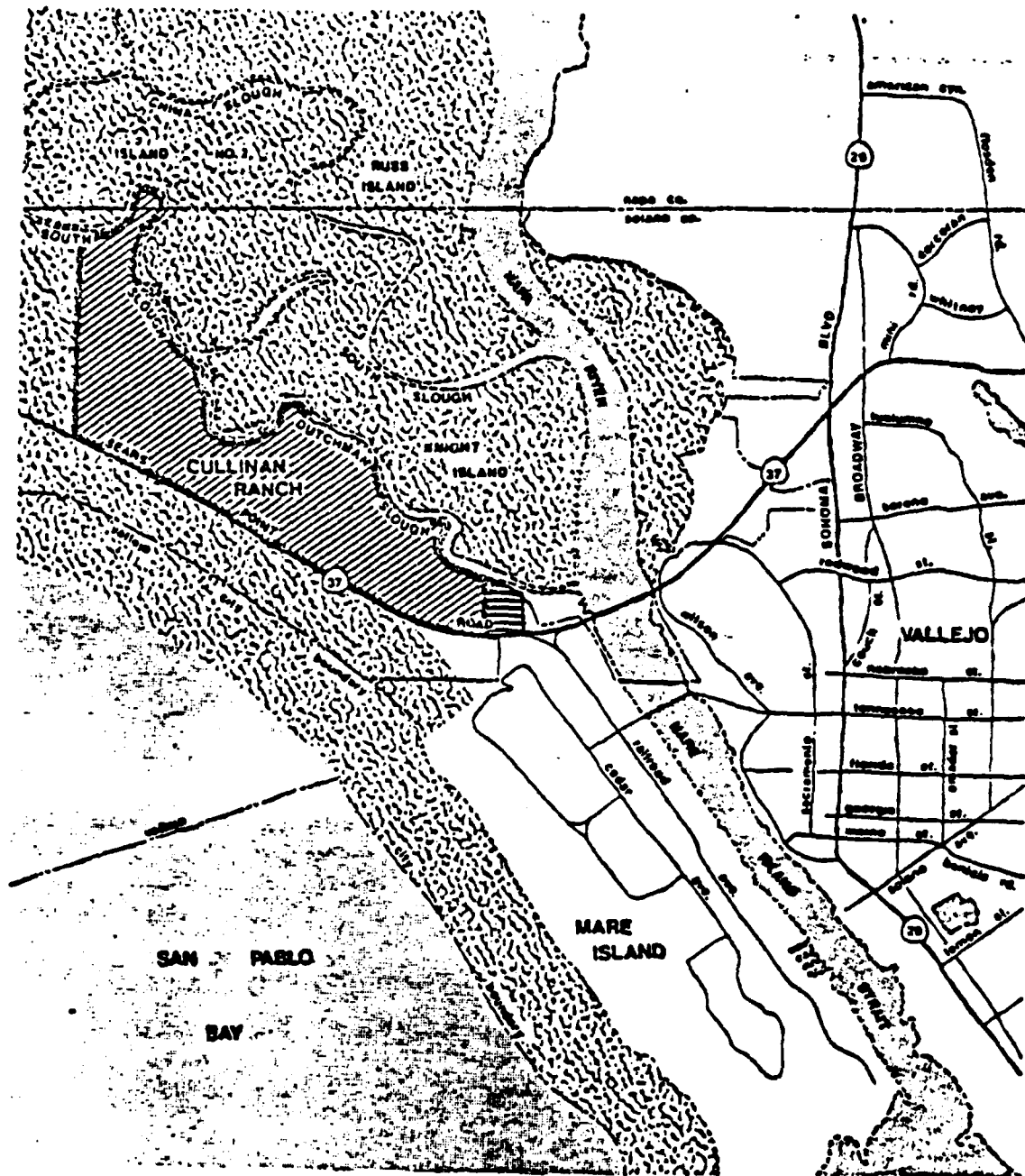
II. METHODOLOGY

A. INFORMATION NEEDS AND ASSUMPTIONS MADE

To determine the extent of Corps of Engineers jurisdiction under Section 404 of the Clean Water Act, the Regulatory Functions staff needed information about the size and the spatial distribution of permanent and seasonal wetlands, i.e., areas meeting the definition of "adjacent wetlands" under Section 404, within the study area. Since the large size of the study area made ground surveys prohibitively costly in terms of time and money, it was decided that an aerial photo analysis of the study area would be the most cost-efficient method to acquire the information needed.

As in any aerial photo analysis, certain assumptions had to be made to complete the assigned task. For this analysis it was assumed that, if a limited number of Section 404 wetlands were identified in the field and plotted on aerial photos, these aerial photos could then be used as photo identification keys. By using such keys, Section 404 wetlands located within the study area could then be identified on the aerial photos through a simple aerial photo interpretation process.

The actual determination of Section 404 wetlands included five different tasks; each discussed separately under the following headings: (1) field investigation, (2) acquisition of aerial photography, (3) photo interpretation, (4) information transfer and measurement, and (5) results of the analysis.



Guadalcanal Village

SOURCE: Cullinan Ranch Specific Plan

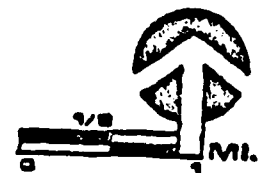


PLATE 1

## B. FIELD INVESTIGATION

The primary purpose of the field investigation was two fold: first, the seasonal and permanent wetland habitats were identified on the ground, and second, the areas thusly delineated were used in the aerial photo interpretation process as photo interpretation keys.

The actual field investigation was undertaken on May 16th and 17th, 1983 by staff from the Regulatory Functions Branch, Corps of Engineers, who transected portions of the study area to delineate representative wetland areas to be used as "ground truth" and as photo interpretation keys. The steps included in the establishment of ground truth included the following: (1) identification of areas where hydrophytic plants were the dominant vegetation type; (2) collection of hydrophytic plant species for verification in the office; (3) documentation of the identified wetland areas through terrestrial photography; and (4) field delineation of the identified wetland areas on a base map.

## C. AERIAL PHOTOGRAPHY ACQUISITION

Historical aerial photo coverage for the study area was acquired for the photo interpretation analysis. The pertinent data for the aerial photography is presented in Table 1.

TABLE 1 - AERIAL PHOTOGRAPHY

TYPE OF PHOTOGRAPHY	SCALE	DATE AND NUMBER	SOURCE
Color Infrared (CIR)	1:12,000	20 May 1980, SPB 12-5	Corps of Engineers
Color Infrared (CIR)	1:12,000	20 May 1980, SPB 12-6	Corps of Engineers
Color Infrared (CIR)	1:12,000	20 May 1980, SPB 13-3	Corps of Engineers
Color Infrared (CIR)	1:12,000	20 May 1980, SPB 13-5	Corps of Engineers
Color Infrared (CIR)	1:12,000	20 May 1980, SPB 14-7	Corps of Engineers
Black & White Pan	Unknown	21 May 1981, None	Applicant
Black & White Pan	1:24,000	14 Apr 1982, SPB 9-2	Corps of Engineers
Black & White Pan	1:24,000	14 Apr 1982, SPB 9-3	Corps of Engineers

## D. PHOTO INTERPRETATION

The photo interpretation process consisted basically of using the photo interpretation keys developed to identify areas on the aerial photos that appeared similar to the interpretation keys and then plot those areas on transparent overlays.

The color infrared (CIR) aerial photographs were used as the "master set" for the actual photo interpretation process. Transparent mylar overlays were placed over the CIR photos and the probable wetland areas were drawn on the overlays. The probable wetland areas were identified by using the photo interpretation keys which had been developed during the field investigation phase when the ground truth was established. The photo interpretation keys were used to identify areas on the CIR which were similar in color and texture to the wetland photo interpretation keys. Areas thusly identified on the CIR set were then compared by the photo interpreter to the same areas on the two black & white pan photo sets. If the same area appeared as a wetland on all three photo sets, i.e., it was similar in shape, it had similar vegetation characteristics, and the soil moisture conditions appeared similar, then the area was plotted on the transparency and determined to be a Section 404 wetland under Corps of Engineers jurisdiction.

#### F. INFORMATION TRANSFER AND MEASUREMENT

The areas delineated on the transparencies were transferred onto base maps provided by the applicant. These maps, which were 1970 topographic maps at a scale of 1 inch = 200 feet (1:2,400), were prepared by Cartwright Aerial Surveys. The areas transferred onto the base map were measured using a polar planimeter to determine the areal extent of the Section 404 wetlands on the Cullinan Ranch.

### III. RESULTS OF ANALYSIS

The final quantities of Section 404 wetlands as determined by the aerial photo analysis are presented in this section in two different categories, (1) permanent and seasonal wetland areas identified on the aerial photos and plotted as irregularly-shaped wetland parcels on the base map and (2) drainage features, which qualify as Section 404 wetlands, such as natural sloughs and vegetated man-made drainage ditches.

#### 1. Irregularly-Shaped Wetland Parcels.

The areal extent of the irregularly-shaped wetland areas was determined using a polar planimeter to measure the areas plotted on the base map. These areas were found to be approximately 108 acres in total area.

#### 2. Drainage Features

Two types of drainage features were identified and delineated on the CIR aerial photos, namely the natural, irregular sloughs and the man-made linear drainage ditches.

a. Natural Irregular Sloughs. These are the natural sloughs identified during the aerial photo analysis. The distances of these features were determined by the use of a "map measurer" (a device that measures the distance of a curved line) on the CIR photos. The total distance was found to be approximately 7,900 feet.

b. Man-Made Linear Drainage Ditches. These are the linear man-made drainage ditches identified during the aerial photo analysis. The distances were determined by direct measure on the CIR aerial photos. The total distance are found to be approximately 69,700 feet.

c. Areal Extent of Drainage Features. The areal extent of the drainage features could not be determined since the scale of the photos prevented measurement of the widths of these features. An indication of the total area can be had by assuming different widths as indicated in Table 2.

TABLE 2 - AREAL EXTENT OF LINEAR DRAINAGE FEATURES

ASSUMED WIDTH OF DRAINAGE FEATURE	AREA OF DRAINAGE (IN SQUARE FEET)	ASSUMED ACREAGE IN ACRES
1 foot	77,570	1.8
2 feet	155,140	3.6
3 feet	232,710	5.3
4 feet	310,280	7.1
5 feet	387,850	8.9
6 feet	564,420	10.7
10 feet	775,570	17.8

*Section 10 = 277 acres*

#### REFERENCES

- Crater, Virginia. 1982. "Applications of Remote Sensing to Wetlands", in Remote Sensing for Resource Management. Johann and Sanders Eds., Soil Conservation Society of American, Ankeny, Iowa.
- Colwell, Robert N., 1983. Manual of Remote Sensing, 2nd Edition. American Society of Photogrammetry, Falls Church, Virginia.
- Williams, David R. and Howard L. Marshall, 1983. "Use of Aerial Photographic Studies in Legal Case Preparations", in Technical Papers - 1983 ACSM-ASP Fall Convention, American Society of Photogrammetry, Falls Church, Virginia.

U. S. Department of the Interior  
Geological Survey

Text and references accompanying  
PRELIMINARY MAP OF HISTORIC MARGINS OF MARSHLAND,  
SAN FRANCISCO BAY, CALIFORNIA

by Donald R. Nichols  
and Nancy A. Wright  
1971

OPEN FILE REPORT

B-13

PRELIMINARY MAP OF HISTORIC MARGINS OF MARSHLAND,  
SAN FRANCISCO BAY, CALIFORNIA

by Donald R. Nichols and Nancy A. Wright

INTRODUCTION

The changes in the margins, size, and depth of San Francisco Bay in historic time have been the subject of much controversy. Estimates of the area that has been filled have been cited as evidence that one of the Nation's most scenic estuaries is rapidly being destroyed. Widespread concern has been voiced on the possible disastrous effects of a great earthquake on structures built on fill overlying soft saturated sediments in the Bay. Legal questions have arisen over the boundaries of original land grants bordering the Bay and the blocking of navigable channels by filling or diking. Data bearing on these and related problems, however, have not been readily accessible or easily compiled.

The location of former margins of salt marshes and old sloughs<sup>1/</sup> and channels have been determined for small areas of the Bay (Bonilla, 1965; Bonilla and Gates, 1961; and Radbruch, 1957, and 1959) or for specific sites. The character of sediments in and between old channels and sloughs may vary markedly and may greatly affect the stability of fill and structures placed over them. However, the location of many of these relic features may be masked from detailed site exploration by fill and evaporation ponds. A detailed synthesis of early surveys for the entire Bay area has long been needed for regional and local planning efforts and for engineering projects. The accompanying map was prepared from the earliest available U. S. Coast and Geodetic Survey (C&GS) topographic surveys (see tabulation of dates and index map) to satisfy these needs. In this compilation "the Bay" is used to refer collectively to all areas marginal to the San Francisco Bay (west to the Golden Gate Bridge), including Carquinez Strait and San Pablo, Grizzly, Suisun, and Honker Bays (east to Pittsburg on the Sacramento River).

SOURCES AND METHOD OF COMPILATION

The preliminary map of historic margins of marshlands was compiled through a series of reductions and interpretation of 32 C&GS topo-

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<sup>1/</sup> For ease of reference and to distinguish them from other channels, sloughs are defined here as sluggish or quiet-water channels that are now open at both ends to the Bay or to a tidal channel tributary to the Bay.

graphic sheets and part of the U. S. Geological Survey 15-minute Mare Island quadrangle (1916 edition). Stable-base film positives were obtained from the C&GS at 1:24,000 by photographic reduction of 25 sheets surveyed between 1850 and 1897 and presently stored in archives in Rockville, Maryland. In seven areas, data was compiled by reduction of paper prints at the original scale of 1:10,000 in a Saltzman overhead projector. The sheet numbers and dates surveyed are tabulated and the area covered by each is shown on the inset. Sloughs, channels, and marsh limits on these early surveys were traced on paper prints of modern USGS 7 1/2-minute quadrangles. Because of some geodetic inaccuracies in the early surveys, in the paper used for the surveys, and possibly in the photographic reduction process, a direct tracing would be grossly misleading. Consequently, data were transferred from the film positives, and adjusted from local control points in small portions of the early map to similar points on modern maps. The control points include topographic highs, intricate stream-meander patterns, cultural features, and geodetic control. In some places, one or more control points within a given area were askew, and arbitrary decisions, based on interpretations of local morphology, were made on how the data were to be adjusted. Compilations made by others would very likely differ in these areas.

The limits of the marshland, the sloughs, and all but a few of the smallest channels shown on the 1:24,000-scale compilation, were reduced in a Saltzman projector and transferred by hand to a single scale-stable base at 1:62,500. This base was compiled from a controlled mosaic of the 1968 edition, 1:24,000-scale USGS maps. The 1:62,500 compilation was photographically reduced and superimposed on an enlargement to 1:125,000 of the 1:250,000 USGS map prepared as a planning base for the Association of Bay Area Governments.

#### DEFINITION OF MAP LINES

##### 1. Inner (landward) edge of marsh

The significance of lines shown on the early C&GS maps and on this map varies from place to place. Shalowitz (1964, p. 181), in discussing early surveys, writes that, in general, the inner, or landward line, of marsh areas, "has always been interpreted (by C&GS)...as indicating the dividing line between the marsh land and the fast or upland, and not as representing any particular tidal elevation other than that inshore of this line and land if bare (of water) at all stages of the tide. Generally, it may be considered as the limit of penetration of the highest tides, but... in certain stages of marsh development (and in nonmarsh areas) it may coincide with the high-water line."

"The detail with which the line was surveyed depended largely upon its accessibility. Not being a feature readily seen by the mariner, the tendency was toward generalization..."

In some areas surrounding the Bay, marsh symbols extend inland from the inner edge of the marsh line shown on the early maps. Such marshes are continuous with the salt-water marshes and probably represent areas of high water table during the winter rainy season and may be underlain by young bay mud although they are not shown on this compilation.

The location of the inner marsh line appears quite accurate in many areas but is in obvious error locally. In the few places where good drainage or topographic control is common to both modern and early maps, the landward limit, if traced directly, would fall well up on natural hillslopes. In such areas of obviously gross error, the inner marsh line was accommodated to the present topography. Examples of such areas occur locally in Suisun Bay and Carquinez Strait. Parts of several early surveys did not extend inland to the inner edge of the marsh. Where more recent C&GS survey sheets were not readily available at the time of compilation, the approximate location of the inner marsh line is shown as a dashed line. This line is based on the general coincidence of the inner marsh line with the modern 5-foot contour and with bayward land-grant boundaries, which appear as a red dash-dotted line on modern 7 1/2-minute quadrangles.

Today, relatively limited areas of original marshland surround the Bay. Comparison of modern C&GS hydrographic charts (5531, 5532, 5533, and 5534) with the mid-1800 surveys indicates that "true" marshland remains only in a large area north of Grizzly Bay; in smaller areas east of Napa Slough and north of San Pablo Bay, east of Dumbarton Bridge, and parts of Bair Island; and in small areas elsewhere. Most of the marshland shown on early surveys has been filled or diked off for various uses, principally as salt evaporation ponds.

## 2. Outer (bayward) edge of marsh

The bayward line, which corresponds to the shoreline on modern maps, normally is defined as mean high water. In practice, however, it represents the outer edge of vegetation--the visible line between marsh grass and mud flat exposed at low tide. This same practice seems to have prevailed in the preparation of early maps with the added note by Shalowitz (1964, p. 177) that, "to the navigator (it) would be the dividing line between land and water. On most early surveys, no distinction was made between this line and the line of high water on fast ground..."

"Where the (early) topographic or hydrologic surveys show a low-water line outside the marsh line (as they do on most topographic survey sheets in the San Francisco Bay area) it would be a safe indication that the marsh at its outer edge was above low water, but it would still be no indication as to the conditions of the marsh with respect to high water unless determined by other evidence."

In many parts of the Bay, extensive mud flats--45,000 acres according to Harvey (1966, p. 17)--are exposed bayward of the outer marsh line during low water. Actually, the large size of this area results from the shallowness of much of the Bay rather than the great tidal range. The maximum tidal range in the Bay varies from only 8.5 feet to 14.0 feet, being least at the confluence of the Sacramento and San Joaquin Rivers and greatest at Alviso in the southern part of the Bay.

## 3. Channels and Sloughs

Most small channels shown on maps of the 1850's are remarkably accurate in detail and relative spacing when compared to the same channels on modern maps. Channels in a few areas, however, evidently were depicted schematically or without close planimetric control. Both accuracy and detail suffered where the surveys did not extend inland to the inner marsh line, such as in parts of Suisun Bay and the Sonoma River

drainage. In the upper Sonoma River drainage, major channels were traced from the 1916 edition of the 1:62,500 Mare Island USGS map. A few of the smallest channels are not shown on the map where their density was so great that they couldn't be represented easily at 1:24,000. The configuration of many of these very small channels is generalized where required by the reduction from 1:10,000 to 1:24,000.

Man has modified the shoreline and many of the larger sloughs and channels; these changes are obvious in some areas and less apparent in others. Migration or modification of meander patterns in many large sloughs and channels, however, probably result from natural processes. Currents, either from stream flow or from in-going and out-going tides, erode the outside curve of a meander and deposition occurs on the slip-off slope, or inside curve. Modification of small sloughs is perhaps less likely because they are generally protected from the direct effects of the full tidal reach. Similarly, small- and intermediate sized channels exhibit little change, probably because they have only minor intermittent fresh-water flow and are protected from tidal currents.

#### GENERAL GEOLOGY OF MARSHLANDS

A number of authors (Louderback, 1939; Trask and Ralston, 1951; Treasher, 1963; Goldman, 1968; Schlocker, 1968, and in press; and others) have described the general geologic framework of San Francisco Bay, its prism of unconsolidated sediments, and, in varying detail, the lithologic and engineering character of the young bay mud. For the purpose of this discussion, a brief, generalized description of the distribution and character of unconsolidated sediments will suffice.

The area encompassed within the lines on the accompanying map is virtually everywhere immediately underlain by "young bay mud." Schlocker (1968, p. 24-25), in a summary description, states:

"The youngest deposits are mostly soft clay and silt (mud) and minor amounts of sand and gravel. In the north-central part of the Bay, sediments are generally coarser in the tidal channels than near the shore, probably because the finer particles are carried out of the Bay by swift tidal currents or are deposited in shallow tidal marshes. Bedrock or sand and gravel are found in the main trunk channel of the Golden Gate and as far north as San Pablo Strait; soft mud or clay are common along and near the shoreline. Local exceptions are the shores of rock headlands where boulders, gravel, and sand are mixed with mud. Scattered sand deposits are also found near locations where ebb tides are concentrated into narrow powerful currents by shoreline projections. North-south sand ridges as much as 6 to 8 feet high, are common between San Francisco and Angel Island, and may be related to the interaction of ebb and flood tidal currents.

"The soft muds, the most common modern sediment, vary considerably in thickness. They are generally less than 10 feet thick near the shore, but are more than 100 feet thick offshore--for example between San Francisco and Yerba Buena Island and in Richardson Bay. In the Redwood Shores-Bair Island area, soft muds are about 10 feet thick near Bayshore Freeway, but about 60 feet thick near the eastern shore of Bair Island, 3 miles to the

northeast. At many places mud is more than 60 feet thick only 1/2 to 1 mile from the landward edge of the marshlands. In many parts of Suisun Bay mud often lies on stiff older clay or on sand deposits. Near the mouths of such streams as San Mateo, San Francisquito, and Alameda Creeks, mud interfingers with sand, gravel, and silt brought into the Bay by the streams."

In addition to sand layers and lenses, significant peat and shell beds occur within the young bay mud in many areas. Virtually all of these sediments have been deposited in Holocene time (the last 10,000 years).

The historic extent of the inner marsh line may be used as a rough guide to the landward extent of young bay mud at the surface. Although young bay mud may be present at the surface inland from this line, such as in adjoining fresh-water marshes, it is likely to be quite thin (less than 5 feet). In the subsurface, young bay mud locally may extend well inland of the marsh line where the mud interfingers with alluvial deposits of the principal drainages such as the Alameda Creek fan in Fremont.

Sediments beneath the young bay mud consist of a sequence of estuarine dense stiff clay and silty clay deposits alternating with alluvial sand and gravel beds. These deposits of middle to late Pleistocene age (10,000 to 2,000,000 years) vary greatly in continuity and thickness; locally they are probably as much as 1,000 feet thick or more in the Santa Clara Valley. Except in areas of rock headlands, older bay sediments probably extend well inland from the marshland limits in the subsurface.

#### ENGINEERING SIGNIFICANCE OF FORMER MARSHLANDS AND BAY MUD DEPOSITS

In recognition of the engineering and environmental significance of San Francisco Bay, the State of California established the San Francisco Bay Conservation and Development Commission (BCDC) with broad regulatory authority over development within the Bay and its bordering mudflats and marshlands. Extensive studies have been made for a broad variety of structures placed on Bay sediments. The results of many of these studies are reviewed in a series of background reports prepared for BCDC and republished as Special Report 97 of the California Division of Mines and Geology, edited by Harold Goldman and titled "Geologic and Engineering Aspects of San Francisco Bay Fill." Suffice it to say that the high water content (generally more than 50 percent by weight); the low bearing strength; the high compressibility (especially where containing peat deposits); the moderately high sensitivity (Mitchell, 1963, p. 29); and, in some localities, a high shrink-swell ratio, constitute factors that must be considered in the exploration, testing design, and construction of engineering projects on younger bay mud. These properties, along with the varying thickness and grain size (and possibly mineralogy) over relatively short distances, can result in marked local differential and regional settlement and in slope instability when loads are imposed on the sediments.

An added concern in relation to large developments is their potential effect in producing significant amounts of settlement in areas of regional subsidence. Subsidence is currently a major problem in the Santa Clara

Valley at the south end of the Bay and in the San Joaquin-Sacramento delta area. In the San Jose area a maximum of 13 feet of subsidence took place between 1912 and 1967, because of ground-water withdrawal (Poland, 1970, p. 288). Much of the subsidence in the delta area apparently is due to desiccation of low-lying peat lands that have been diked off for farming operations and exposed to subaerial weathering. Local surface settlement when combined with regional subsidence can create a severe potential for flooding of large areas, especially where protective dikes rest on low-strength young bay mud. Studies by Raymond Pestrong (1965, 1969, and undated) show measurable differences in engineering properties of young bay mud between channels, marshes, and mudflats; such differences are of course minor relative to those between these environments and alluvial soils marginal to the Bay. For example the moisture content may be 2 to 5 times greater; the density only about half; and the shear strength less than one-tenth as great in the mud as in alluvial soils. However, in areas above high-tide level or that have been diked off and drained, young bay mud slowly desiccates to a depth of 3 or 4 feet and achieves a moderate strength.

During earthquake shocks, sand and silt "... layers have a tendency to lurch, subside, and slide. Earthquake vibrations in thick soft bay mud are believed to be larger in amplitude and tend to have longer periods of vibration than those in firm soil or rock. Because these longer periods might be in the same range as the natural periods of vibration of some high-rise structures, it is necessary to pay special attention to their design." (Schlocker, 1968, p. 25.)

The potential hazard of liquefaction of sand is difficult to assess and even more difficult to design around. The geologic occurrence of sand in young bay sediments is not well known. However, sand is known to be present locally near the surface in sand bars (e. g. in the vicinity of San Francisco airport) and interbedded with the young mud at shallow depth (e. g. at the Palo Alto marina). Sand is most likely to occur within the mud near the mouths of major channels and sloughs. Because sloughs and channels may migrate considerably through geologic time, particularly near the toes of large alluvial fans, buried channel deposits containing sand and (or) organic clay may occur nearly anywhere beneath the surface in young bay mud. Consequently, extremely detailed subsurface investigations are required to locate these potentially troublesome foundation conditions.

#### REGIONAL PLANNING SIGNIFICANCE OF FORMER MARSHLANDS

In the past 120 years the Bay and its margins have undergone many significant changes. In the mid-1800's the Bay to the outer marsh edge covered 476 square miles. Today, the Bay covers only 423 square miles--a reduction of 53 square miles or 11 percent. Historically, marshlands (including sloughs and channels less than 1/2 mile wide) have covered as much as 313 square miles marginal to the Bay. Modern (1968) tidal marshland consists of 125 square miles--a reduction of 188 square miles or 60 percent. Salt evaporation ponds cover 63 square miles (40,000 acres) of former marshland, sloughs, and channels. Deposition, either natural or man-induced (Gilbert, G. K., 1917), and disposal of dredged waste

have added 52 square miles of land to the Bay; erosion and dredging have removed 3 square miles of former marshland or fast land.

In addition to providing a detailed analysis of the extent of urban and industrial encroachment into San Francisco Bay, the accompanying map can be applied effectively to a variety of planning problems, some of which are suggested below:

1. The features depicted on this and additional maps (e.g., those showing bedrock and thickness of young bay mud) directly affect the capability of the land (and Bay) to support a variety of uses and therefore, when evaluated from a regional planning point of view, should provide some basic parameters on which to base land-use decisions.
2. Disaster planning must assess the potential extent of disruption during a strong earthquake of urban structures built on fill over young bay mud. Rupture of gas lines, for example, could create a severe fire threat that would be difficult to meet if water lines also were broken and streets were damaged and made impassable to fire-fighting equipment.
3. In order to eliminate damaging differential settlement under structures in areas of thick, highly compressible or potentially liquefiable materials (major sloughs and possibly elsewhere), extensive excavation and back-filling or costly engineering design would be required. Where these conditions prevail, retention of the original estuarine environment may be an alternative worth considering.
4. The ground-motion response of young bay mud during earthquakes is a subject of current controversy. Although the map delineates the areal distribution of the mud, only general conclusions can be drawn as to its thickness--a critical factor in ground-response. Until the engineering properties of the mud are better known and the state-of-the-art in earthquake engineering is greatly advanced, it will be difficult to devise explicit planning guidelines for marshland development. Interim alternatives include retaining the marshlands in their current state or requiring extremely detailed (and costly) site investigations to demonstrate clearly that the risk to structures from potential ground failure and from damage due to shaking can be reduced to acceptable levels.
5. Marshland areas that have been filled and developed can be located by study of the map. Since the fill that preceded early development on marshland and bay deposits was often haphazard, the present stability in such areas is unknown. Consequently, policy-makers may wish to consider restricting development or redevelopment in filled areas until building officials can be assured that the fill was placed in accordance with modern engineering standards or that the fill, through time, has achieved acceptable levels of static and dynamic stability.
6. The C&GS sources used in this report provide an excellent reference bearing on certain historical and legal questions. Original land-grant boundaries were established in part from the location of the inner (landward) marsh line; the C&GS surveys provide one means of assessing the accuracy of these boundary lines. Descriptive reports that accompany topographic and hydrologic surveys issued after 1887 often cite small communities that were served by boat commerce, indicating that waterways leading to them were navigable.

7. Areas of bay-shore erosion (retreat) and deposition (advance) during the last 120 years that have planning, engineering, and scientific implications are evident from the map.
8. The map also indicates pre-existing surface forms that would serve as excellent sites for special topical studies: for example, studies on depositional environments of large versus small sloughs and channels; on grain size, shear strength, and other physical properties of natural-levee materials versus those in marshes and mudflats; or on the hydrologic effects of filled channels that were once covered by evaporation ponds.

#### SUPPLEMENTAL NOTE

Many of the original film positives at 1:24,000 scale and paper prints of modern maps on which the original data have been interpreted and compiled are available for inspection and reproduction at cost through the USGS library in Menlo Park, California. The intermediate compilation at 1:62,500 on scale-stable mylar is undergoing refinement and revision and is not available.

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- U.S. Geological Survey, 1916, Mare Island 15-minute quadrangle.

**APPENDIX C**

**Sphere of Influence Change for Cullinan Ranch. Memorandum from Michael Roush, Vallejo Assistant City Attorney to Ann Merideth, Assistant Planning Director, October 7, 1983**

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OFFICE OF THE CITY ATTORNEY  
CITY OF VALLEJO  
CITY HALL  
VALLEJO, CALIFORNIA 94590

*Response to  
Sphere of Influence  
legality*

October 7, 1983

SUBJECT: Sphere of Influence Change for Cullinan Ranch

TO: Ann Merideth, Assistant Planning Director

Torrey & Torrey, Inc., EIR Consultants for the Cullinan Ranch, has requested a memo from this office concerning the Sphere of Influence Change for the Cullinan Ranch. Evidently, this issue was raised at the hearing on the Draft EIR.

On June 21, 1982, the City Council by Resolution No. 82-390 N.C., certified a negative declaration for a proposed sphere of influence change to include the Cullinan Ranch property.

With respect to negative declarations, the CEQA Guidelines at §15083(f)(1) provides as follows:

After making a decision to carry out or approve a project for which a Negative Declaration has been prepared, the Lead Agency shall file a Notice of Determination.

The Lead Agency is to file the Notice with the County Clerk. Public Resources Code, §21152(a). Through inadvertence, however, the City, as lead Agency, failed to file the Notice with the County Clerk in June, 1982.

In August, 1982, the Local Agency Formation Commission (LAFCO) of Solano County granted the City's request to expand its sphere of influence to include all of Cullinan Ranch, subject to certain conditions. LAFCO likewise adopted a Negative Declaration with respect to this matter. However, in that LAFCO was not the Lead Agency on this subject, it was not required to file a Notice of Determination.

In June of this year, the City became aware that the Notice of Determination had not been filed with the County. The significance of filing the Notice is that it triggers a special statute of limitations with respect to an action or proceeding to attack, review, set aside, void or annul the decision of public agency on the basis of noncompliance with CEQA.

Specifically, Public Resources Code, §21167(b) provides that any action or proceeding alleging that a public agency has improperly determined whether a project may have a significant effect on the environment shall be commenced within 30 days after the filing of the notice required by...subsection

Subject: Sphere of Influence Change for Cullinan Ranch

Pg.2.

(a) of Section 21152 (i.e., the filing of the Notice of Determination).

In that the statute of limitations does not begin to run until the Notice is filed, the Notice was filed with the County Clerk on June 29, 1983. It was posted thereafter by the County for the required 30 days. Pub. Res. Code. §21152(c).

It is, therefore, my opinion that the statute of limitations has run on any action or proceeding alleging that the negative declaration for the sphere of influence change has been improperly determined.

I trust that this will answer adequately the concerns of the EIR Consultant on this matter.

Very truly yours,

JOHN M. POWERS  
City Attorney



MICHAEL H. ROUSH  
Assistant City Attorney

MHR/bls

**APPENDIX D**

**City of Vallejo Subdivision Activity List,  
prepared by Vallejo Planning Department,  
January 2, 1984**

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Date: 1/2/84

Price: 50¢

## SUBDIVISION ACTIVITY LIST (Projects Over 30 Units)

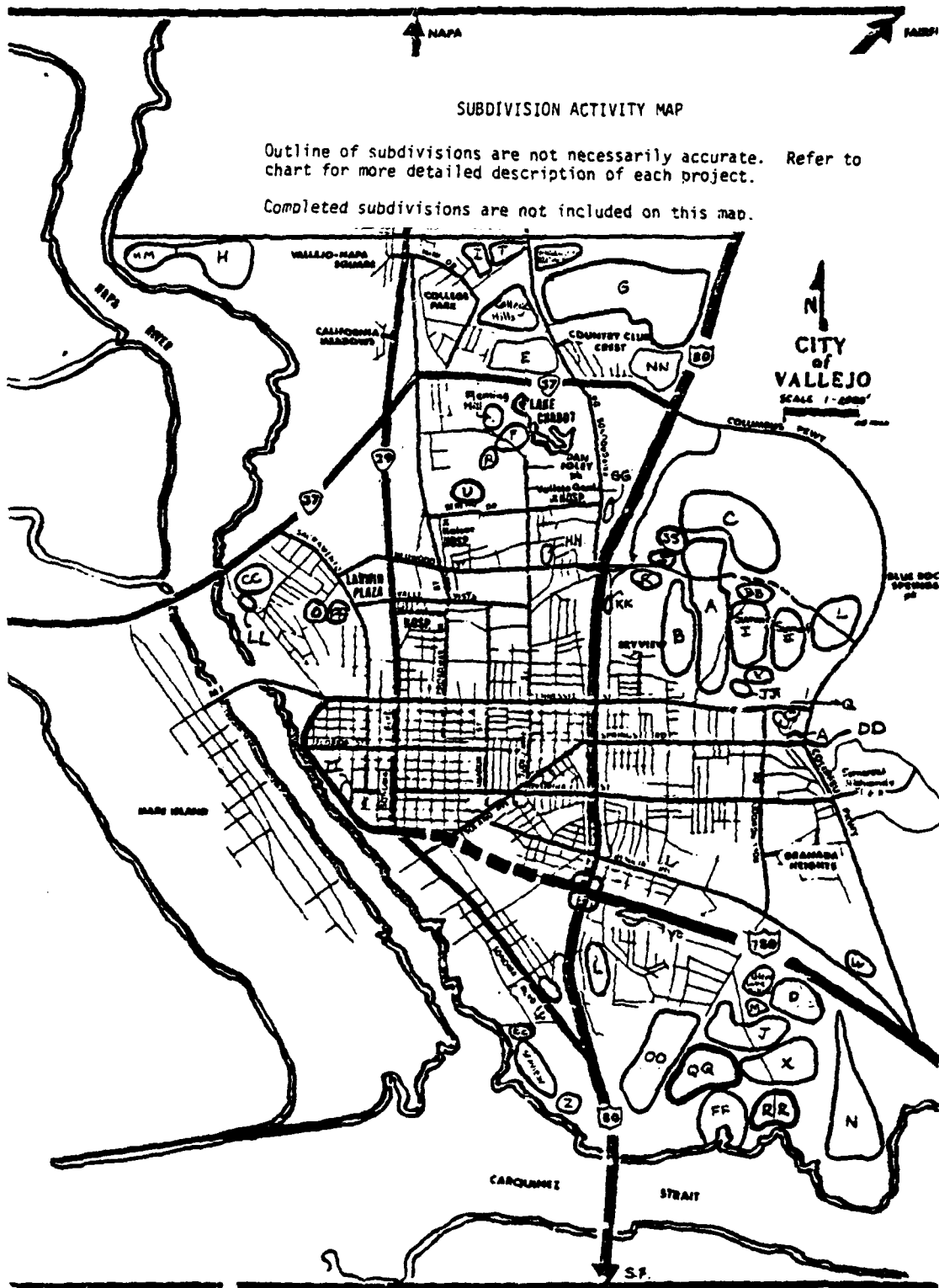
	NAME/DEVELOPER	ENG/ARCH	UNITS UNIT TYPE	ACRES	ENV REV	TEXT MAP PLANNING	EXT TO	FINAL MAP	BLDG PERMIT ISSUED/FINALED
A.	76-21 Woodridge Citation Homes	Schwafel	424/SF	174	-	12/7/76		Filled	424/419
B.	77-24 Ridgecrest Presley	Schwafel	168/SF	59	-	10/4/77		Filled	167/162
C.	77-25 Hunter Ranch Presley	Schwafel	524/SF	156	X	10/26/77		Filled	71/63
D.	78-01 Glen Cove II Larwin Company	Creegan D'Angelo	176/SF	59	X	2/19/78 PC		Filled	146/97
E.	78-16 (81-25)* (83-14)* Town & Country Braddock & Logan	B & D	341/SF (188/SF) (246/SF)	81	X	6/6/78 (7/21/81) (9/7/84)		3 of 4	175/138
F.	78-17A Skye Ridge K & R	Tetrad	99/SF	25	X	6/3/80		Filled	50/11
G.	78-18 Cimarron Hills Shea Homes	HWH	681/SF	349	X	6/6/78 PC 7/3/78 CC	7/3/83	5 of 8	292/232+236
H.	78-34 Sandpiper Miller Sorg	B & D	293/SF	60	X	9/19/78	9/19/83	Filled	149/85+98
I.	78-40 Adnhe Ridge (Heritage Highlands) Barratt	B & D	96/SF	25	X	10/21/78		Filled	46/46
J.	79-04A Glen Cove III Morrison Homes	Tetrad	283/SF	120	X	8/5/80 PC 9/8/80 CC	3/8/84		14/0
K.	79-05 IDP 13 Dawson Ridge (Prospect Hills) K & B	Schwafel	116/SF	30		4/3/79		Filled	116/51

\*81-25 is a resubdivision of a part of the original subdivision 78-16.

	NAME/DEVELOPER	ENG/ARCH	UNITS UNIT TYPE	ACRES	ENV REV	TENT MAP PLNG	EXT TO	FINAL MAP	BLDG PERMIT ISSUED/FINALED
L.	79-07 Somerset Highlands Ditz Crane	Schwafel	219/SF	101	X	5/22/79 PC 6/18/79 CC		Filed	72/70
M.	79-08 Meadow Glen Citation	Hackay & Samps	31/SF	10	X	5/1/79		Filed	0/0
N.	79-21 Dillon Point (Carquinez Highlands) K & B	Arfan et al	443/73 SF/Condos	301	X	7/3/79 PC 6/16/81 10/9/79 CC	5/6/83		0/0
O.	81-26 Hillside Gardens Scola	LDA	27/Condos	1.59	X	8/18/82	8/18/84		0/0
P.	79-36 Vallejo Condos Bonatre (Lund)	Schwafel Knorr Assoc	104/Condos	5.2	-	10/6/79 PC	10/6/84	Filed	57/57
Q.	79-42 Forest Hills Global Homes	B & O Chang	46/Condos	5.3	-	9/1/81		Filed	46/16
R.	80-06A Redwood VII Condos 2 Pacific NW	Prodis Assoc	136/Condos	7.4	-	12/15/81	12/15/84		0/0
S.	11P 1906 Redwood VII I (2nd Phase) Hibernia Bank	Prodis	74/Condos	3.8	X	10/4/83		Filed	0/0
T.	80-12A Vallejo Hills (Hobille Home Sub) Newell	Cassayre	110/PH	16	X	9/7/84		1 of 2	40/25
U.	83-24 Strawberry Hills (Phase II) Young American Homes	-	80/condos	5.6		12/6/83			
V.	80-18 Alta Loma Condos Kulka	Schwafel Ettinger	106/Condos	10	-	5/6/80 PC 8/18/80 CC	2/18/83	Filed	0/0
W.	80-25 Port of Call Romac	D.R. Flett & Assoc/Ross	72/Condos	5.8	-	6/17/80	12/17/82		56/0

	NAME/DEVELOPER	ENG/ARCH	UNITS UNIT TYPE	ACRES	ENV REV	TENT MAP PLNG	EXT TO	FINAL MAP	BLDG PERMIT ISSUED/FINALED
X.	80-29 Glen Cove (Unit 4) Morrison Homes	Tetrad	127/SF	81	X	12/16/80	10/16/84		0/0
Y.	80-47 Pagni Condos PUD 546	Rawicz	36/Condos	2	-	12/16/80 12/16/79		Filled	0/0
Z.	83-22 Seashore UP 1912 Jack Crystal	Pacific	160/Condos	16	X	10/18/83			0/0
AA.	81-13 Tennessee Pointe UP 1778 Phillip Gay	Schwafel	76/Condos	5.7	-	4/21/81	4/21/84	1 of 2	13/0
AB.	81-15 Valley Glen UP 1786 Rulluck	Schwafel Ettinger	5/120 SF/Condos	32.5	X	5/19/81	5/19/84		0/0
AC.	81-21 Bridge Port PUD 566 Housing Group	Toups Rates	240/SF	35.6	X	8/4/81	8/4/84		0/0
AD.	83-25 - UP 1919 Kernan	Tyrrell	28/Condos	3	X	12/6/83			0/0
AE.	81-32 Costa de Oro UP 1807 Hancock Builders	Schwafel	38/Condos	3.2	X	11/3/81	11/3/84	1 of 2	0/0
AF.	PUD 567 Elliott Cove Western Water Ways Design for Com. Places	Creegan D'Angelo	260/Condos 30/SF	121.5	X	12/15/81	12/15/83		0/0
AG.	81-38 Coleman UP 1817 Redwood Terrace	Abrams	45/Condos	1.9	-	2/2/82			0/0
AH.	82-01 Eidemuller UP 1820 (Panorama)	Dougherty	45/Condos	3	-	2/17/82			0/0
AI.	82-06 Mariner's Landing UP 1836 Mariner's Assoc.	Sandy & Rabcock	182/Condos	12	-	6/2/82		1 of 2	94/0

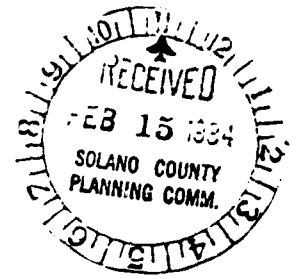
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JJ.	82-07 UP 1842	The Arbors Lafayette Federal	DK Fye	34/Condos	3.7	-	6/15/82		12/12
KV.	82-16 UP 1849	Kathy Ellen Condos Pacific MI Dev Corp	Prodis	60/Condos	2.6	-	12/7/82		0/0
LL.	82-17 UP 1851	Bridgeview Bridgeview Investors	Caraspace	46/Condos	2.9	-	9/21/82		0/0
MM.	83-01	Sandpiper Unit 9 Miller-Sorg	R & D	80/SF	19	X	2/15/83		0/0
NN.	83-02	Collins Ranch Shea Homes	WHH	257/SF	64	X	3/15/83		0/0
OO.	83-03	Shadow Ridge Citation Homes	MacKay & Samps	285/SF	117	X	4/19/83		0/0
PP.	83-13	(Skyview Terrace) Skyview Investments	Robt. Martin	30/Condos	1.8	X	9/7/83		0/0
QQ.	83-19 PUD 572	Glen Cove V Larwin	VCA	309/SF 120/Condos 19/Estate	139	X	10/4/83		0/0
RR.	83-18 PUD 573	Valle Ensenada Larwin	VCA	60/TH 158/SF	57.7	X	11/15/83		0/0
SS.	83-28 UP 1921	Newell Property Presley	PRC	143/SF	15.98	X	12/20/83		0/0



**APPENDIX E**

**Proposed Standards and Procedures for the Evaluation of  
Annexation Proposals Submitted to the Solano County LAFCO,  
prepared for the Solano LAFCO by Robert E. Grunwald and  
Bruce O'Neal, January 1984**

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2nd REVISED DRAFT

(for a LAFCO Workshop, February 6, 1984)

PROPOSED STANDARDS AND PROCEDURES FOR THE EVALUATION  
OF ANNEXATION PROPOSALS SUBMITTED TO THE SOLANO COUNTY  
LOCAL AGENCY FORMATION COMMISSION (LAFCO)

Prepared for  
THE SOLANO COUNTY LOCAL AGENCY FORMATION COMMISSION

Prepared by  
ROBERT E. GRUNWALD, AICP, ASLA  
and  
BRUCE O'NEAL, AICP

January, 1984

## PREFACE

On December 5, 1983, the Solano County LAFCO held a public hearing to discuss Proposed Standards and Procedures for Evaluating Annexation Proposals and a Draft EIR on the proposed standards. In addition to the public hearing, the consultant team also held informal meetings with members of city planning and administrative staffs in the County, and with representatives of the development community to receive their input.

The consultants also received extensive written comments resulting from the Draft EIR public review process. Based on this cumulative review, this draft report has been prepared for LAFCO to provide direction in preparing the Final Standards Report.

Each standard has been reviewed in detail and all have been revised to some extent. In a few cases, alternative standards have been provided in addition to the recommended revision for the Commission's deliberations. Following the February 6 workshop, the Standards report will be finalized and response to comments on the Draft EIR will proceed depending upon the Commission's direction.

## PART 1: INTRODUCTION

The proposals of this report are in response to a recent Solano County Superior Court decision that Solano County's LAFC prepare and adopt standards and procedures for the evaluation of proposed annexations to cities within the County, as set forth in the Knox-Nisbet Act (Government Code Sections 54773, et. seq., Stats., 1963, c 1808), as amended.

First adopted in 1963, the Knox-Nisbet Act sets forth the powers and responsibilities for LAFCO's throughout the State. Successive amendments to the Act have tightened requirements for LAFCO review to prevent urban sprawl and protect prime agricultural land. The Act also sets forth factors which must be addressed in pursuing these broad objectives of review.

This report provides both general and specific standards in meeting the requirements of the Knox-Nisbet Act, and in assuring a rational and consistent process of review by the Solano LAFCO which can be applied to all proposals for annexation to cities of Solano County.

Proposals have been developed in light of varying conditions of land use policy among the seven cities of the County with sensitivity to separate as well as common issues among the cities, and in recognition that final decisions by LAFCO will be judgmental--based on the facts in evidence as they relate to proposed standards and procedures. No standard can be universally absolute with respect to a given proposal for annexation, for the facts and circumstances will necessarily differ among communities and annexation proposals.

The proposed standards further recognize that any preconceived policy of local government, or of individuals or organizations which may support or oppose a given annexation proposal, must stand the test of objective evaluation. For example, an opposition viewpoint should be made to stand the same tests as that of the proponents of an annexation. The proposed standards reflect the many circumstances which can affect the annexation process, leaving final decision to objective analysis based on the evidence submitted as a whole in support or in opposition in a given case.

### FORMAT AND CONTENT

This report first sets forth the primary purposes and objectives of the Knox-Nisbet Act and the factors for which standards must be developed by the Solano County LAFCO. The standards are then presented with a description of the variety of circumstances and conditions which may come into play in reaching a decision. The report also describes circumstances and conditions which may be peculiar to a given city and which should be considered in LAFCO's decisions.

## PART 2: ESSENTIAL REQUIREMENTS OF THE KNOX-NISBET ACT

### BASIC OBJECTIVES

The Knox-Nisbet Acts sets forth the following basic objectives:

1. To encourage and provide planned, well-prepared, efficient urban development patterns with appropriate consideration of preserving open-space lands within such patterns. (Section 54774.5)
2. In seeking to preserve open-space lands, and where a proposal would result in the conversion of existing open-space lands to non-open spaces uses, LAFCC shall consider the following: (Section 54790.2)
  - a. Non open-space uses shall be guided away from the existing prime agricultural lands in open-space use toward areas containing non-prime agricultural lands, unless such action would not promote the planned, orderly, efficient development of an area.
  - b. Development of existing vacant or non-prime agricultural lands for urban uses within an agency's boundaries of jurisdiction or sphere of influence should be encouraged before any proposal is approved which would allow for or lead to the urban development of existing open-space lands outside of an agency's jurisdictional boundaries or sphere of influence.

These objectives are fundamental in their impact on LAFCC's decision process. They give critical dimension to the manner in which individual standards are applied to the factors prescribed by the Knox-Nisbet Act. Consequently, they, in effect, become standards in themselves and require discussion as such as part of the standards which follow.

In addition to ~~the standards arising from~~ the basic objectives discussed above, the Knox-Nisbet Act requires that standards be ~~established~~ <sup>considered</sup> with respect to the following factors: (Section 54796)

- (a) Population, population density; land area and land use; per capita assessed valuation; topography, natural boundaries, and drainage basins; proximity to other populated areas; the likelihood of significant growth in the area, and in adjacent incorporated and unincorporated areas, during the next 10 years.

- (b) Need for organized community services; the present cost and adequacy of governmental services and controls in the area; probable future needs for such services and controls; probable effect of the proposed incorporation, formation, annexation, or exclusion and of alternative courses of action on the cost and adequacy of services and controls in the area and adjacent areas. As used in this subdivision, "services" is to be construed as referring to governmental services whether or not the services are such as would be provided by local agencies subject to this chapter, and as including the public facilities necessary to provision of services.
- (c) The effect of the proposed action--and of alternative actions--on adjacent areas, on mutual social and economic interests and on the local governmental structure of the county.
- (d) The conformity of both the proposal and its anticipated effects with both the adopted commission policies on providing planned, orderly, efficient patterns of urban development and the policies and priorities set forth in Section 5470.2 of this code.
- (e) The effect of the proposal on maintaining the physical and economic integrity of lands in an agricultural preserve in open-space uses.
- (f) The definiteness and certainty of the boundaries of the territory, the nonconformance of proposed boundaries with lines of assessment or ownership, the creation of islands or corridors of unincorporated territory, and other similar matters affecting the proposed boundaries.
- (g) Conformity with appropriate city or county general and specific plans.
- (h) The "sphere of influence" of any local agency which may be applicable to the proposal being reviewed.

Not all of the above factors are adequately organized by topic so as to provide an understanding as to how they reasonably should be made to apply. They are, therefore, reorganized under PART 3 for clarity.

PART 4 of this report describes the recommended procedures for processing an application for annexation before the Solano County LAFCO. Currently, LAFCO follows a procedure which first determines whether a proposed annexation involves territory within a city's sphere of influence. Second, it makes a determination of consistency with the applicable general plan; third, it requires that the application indicate that proper pre-zoning is being sought consistent with the city's general plan and zoning ordinance; and, fourth, it determines if there is an adequate capability to provide municipal-type services. These procedures are augmented in PART 4 to avoid unnecessary investment of LAFCO time while assuring a logical sequence of events, especially in relation to the proposed new standards and the objective of efficiency of governmental action.

STANDARD NO. 1:      RELATIONSHIP TO ESTABLISHED BOUNDARIES, LINES  
                                 OF ASSESSMENT, REMAINING UNINCORPORATED TERRITORY,  
                                 PROXIMITY TO OTHER POPULATED AREAS, AND ASSESSED  
                                 VALUATION

*An application for annexation or sphere of influence boundary change shall provide a legal description based on established ownership assessment boundaries and road rights-of-way where feasible. The application shall describe the assessed value of the proposal, the extent to which unincorporated islands or corridors would be created, and whether the property will be annexed to or detached from special districts. A map shall show proximity of the proposal to other populated areas and the relationship of the proposed boundaries to those of all affected public entities, such as school districts, irrigation districts, and assessment districts. The map shall also show the relationship of the property to the property lines of adjacent owners.*

Recommended Revision: . RELATIONSHIP TO ESTABLISHED BOUNDARIES, LINES OF  
                                 ASSESSMENT, REMAINING UNINCORPORATED TERRITORY,  
                                 PROXIMITY TO OTHER POPULATED AREAS, ASSESSED  
                                 VALUATION

LAFCO shall, where possible, avoid irregularities and overlapping of established boundaries in the annexation process which would otherwise create problems for taxing districts, including the loss of tax revenues required for district operation. To this end, each application shall include the following information:

1. A legal description of the property.
  - a. The description shall follow established ownership boundaries and road rights-of-way where feasible. Documentation shall be submitted indicating reasons for not adhering to this requirement.
  - b. Boundaries shall not be drawn so as to create an island, corridor, or strip either with the proposed territory or immediately adjacent to it. Where such an island, corridor, or strip is created, documentation shall be submitted indicating reasons for not adhering to this requirement.
  - c. To the greatest extent possible, boundaries shall follow existing political boundaries, and natural or man made features such as

streams, lakes, natural terrain, railroads, roads and freeways. Where boundaries do not meet this standard, documentation shall be submitted indicating reasons for not adhering to this requirement.

- d. City boundaries at county roads or city streets shall follow road or street rights-of-way lines and shall cross streets and roads at right angles. Intersections shall be located entirely within one jurisdiction. City streets or county roads shall be continuous as far as possible.
  - e. "Half width" streets or roads where the city boundary is located on the centerline of the throughfare are not permitted. City boundaries shall not cross a street/road at an oblique angle and city boundaries shall not divide intersections.
2. The area of the annexation in acres or square feet.
  3. A map or other information showing relationship to adjacent properties, city limits, and boundaries of special districts and school districts. An proposal which is adjacent, on or within 300 feet of any sphere of influence boundary, shall show said boundary on a map and label the agency affected. This may also be accomplished by submitting an additional map at a scale sufficient enough to indicate the proposal's relationship with said spheres or by incorporating a vicinity map with the boundary description.
  4. A description of land uses and population in the vicinity.
  5. A map of lands in agricultural preserve.
  6. A map showing location of existing roadways, sewer mains and other public facilities.
  7. A description of proposed development and necessary public facilities.
  8. Assessed value as carried out on the last equalized roll.

~~The purpose of this standard is to avoid irregularities and overlapping of established boundaries which otherwise would create problems for taxing districts, including the loss of tax revenues required for district operations.~~ An example is provided by annexations which are proposed to be detached from the Solano Irrigation District and where the property involved is a party to the indebtedness incurred in the construction and maintenance of Monticello Dam and its irrigation distribution facilities. In such event, LAPCO should continue to impose detachment fees in accordance with a formula agreed upon with SID (or other district in a similar situation) to assure equity in meeting financial obligations of the district. Other purposes are to avoid <sup>where possible</sup> irregularity in the shape of remaining parcels, to avoid conditions which would make the annexation of adjacent parcels difficult at a later date, and to avoid the exclusion of parcels which are necessary to assure a planned, orderly, efficient pattern of urban growth.

STANDARD NO. 2: CONSISTENCY WITH SPHERE OF INFLUENCE (SOI)  
BOUNDARIES

*Any application for annexation which involves territory outside of a city's approved sphere of influence boundary shall not be accepted by LAFCO, unless the application is also accompanied by a formal request for amending the boundary together with supporting information and analysis.*

Recommended Revision: CONSISTENCY WITH SPHERE OF INFLUENCE (SOI) BOUNDARIES

An area proposed for annexation shall be within the affected city's sphere of influence. An annexation application for lands outside an adopted sphere of influence may be considered concurrently with a request for amendment to the sphere of influence, however.

All cities in the County currently have sphere of influence boundaries adopted by LAFCO. Thus, a finding for consistency with adopted boundaries becomes the first test in evaluating an annexation proposal. In most cases, location within or outside the boundary will determine whether the application should be accepted.

~~It is possible that future applications for SOI boundary modification by one city could be contested by another. Such possibilities exist between Vacaville and Fairfield, and perhaps between Benicia and Vallejo. SOI boundaries, as adopted by LAFCO, can be changed only in accordance with application of essentially the same standards as proposed here for evaluating annexation proposals. The wording of state law in this regard is almost identical as to factors to be considered.~~ It is important to note that the SOI boundary is not necessarily intended by law to be coterminous with the area which a given city may eventually annex and urbanize. Rather, it <sup>now</sup> refers to the area which most directly involves the interests of a given city--as to future urbanization, the management of resources of concern to the city, or actions contemplated by the County in considering land use proposals of an essentially non-urban character.

The SOI concept was introduced into law originally to provide a rational basis for determining when a given city has the most appropriate interest in development policy for unincorporated territory in proximity to its boundaries. Annexation battles among cities within metropolitan areas were common and often gave rise to municipal boundaries which were inequitable in the distribution of tax benefits derived from large-scale commercial and industrial development, and in the distribution of responsibilities and costs for providing urban services.

### STANDARD NO. 3: ANNEXATION TO THE LIMITS OF SOI BOUNDARIES

*An application for annexation out to the limits of a city's SOI boundaries shall be consistent with all applicable standards for evaluation adopted by LAFCO.*

#### Recommended Revision: ANNEXATION TO THE LIMITS OF THE SOI BOUNDARIES

Annexation to the limits of the SOI boundary shall not be allowed if the proposal includes land designated for open space use by the affected city's general plan unless such open space logically relates to existing or future needs of the city. Open space uses which may be located within city limits include community and city-wide parks, recreational facilities, wind energy projects, reservoirs, and stormwater detention basins.

It has become fairly common throughout the state in recent years to find cities annexing territory out to their SOI boundary, involving more land than reasonably can be justified for many decades as being appropriate for eventual urbanization and municipal management. ~~Land which is to be retained in open space use under policies of the General Plan should remain unincorporated unless the type of open space use (e.g., a community park) logically relates to existing or future needs of the city.~~

### STANDARD NO. 4: CONSISTENCY WITH A CITY'S GENERAL PLAN AND SPECIFIC PLAN

*An application for annexation which involves proposals for the conversion of open-space land to urban use which currently is not consistent with policies and proposals of a city's general plan or applicable specific plan should be denied by LAFCO, unless the application is also accompanied by information and analysis which supports an amendment to the general plan or specific plan. A city shall first process a general plan or specific plan amendment prior to formal application for annexation unless the amendment is of a minor character.*

Recommended Revision: It is recommended that Standards No. 4 and 5 be combined into a single Standard; see recommended change below.

### STANDARD NO. 5: INTERNAL CONSISTENCY WITH A CITY'S GENERAL PLAN AND ZONING ORDINANCE

*An application for annexation which reveals internal inconsistencies among elements of the city's general plan should not be further considered by LAFCO until the inconsistencies are corrected by the city through general plan amendment. A city shall first certify that all elements of its general plan are internally consistent, and that the city's zoning ordinance is also consistent with that general plan.*

Recommended Revision: CONSISTENCY WITH APPROPRIATE GENERAL PLAN, SPECIFIC PLAN, AREA-WIDE PLAN AND ZONING ORDINANCE

An application for annexation which involves the conversion of open space lands to urban use shall be denied by LAFCO if the proposed conversion is not consistent with applicable general plans, specific plans, area-wide plans, or zoning ordinances. The determination of consistency shall be the responsibility of the affected city, and shall be met by a resolution approved by the City Council certifying that the proposed annexation meets all applicable consistency requirements of State Law, including internal consistency between the City's adopted plans and the City's zoning ordinance.

#### STANDARD NO. 6: REQUIREMENT FOR PREZONING

*Prior to application to LAFCO for annexation, a city shall first prezone the property proposed for annexation in a manner consistent with the city's general plan or specific plan.*

Recommended Revision: REQUIREMENT FOR PRE-APPROVAL

Prior to approval of annexation by LAFCO, the affected city shall have granted one or more of the following development approvals: (a) prezoning, (b) area-wide plan, (c) specific plan, or (d) development agreement.

Explanation. Knox-Nisbet provides for the ability to require prezoning as a method to determine future land use and consequently, to gauge the annexation's impact on service delivery and conversion of open space lands. Since adoption of Knox-Nisbet, however, a variety of more contemporary planning tools have come into use which provide a greater level of developmental detail. The standard has been expanded to accommodate these methods.

Knox-Nisbet (Section 54790) prohibits LAFCO from imposing any conditions which would directly regulate land use, property development, or subdivision requirements. In addition, LAFCO may not specify how, or in what manner, territory shall be prezoned. The requirement for prezoning as a condition of annexation, therefore, provides further assurance that the proposed annexation is consistent with the city's general plan.

## STANDARD NO. 7: CONSISTENCY WITH THE COUNTY GENERAL PLAN

*An application for sphere of influence boundary change or district annexation which is not consistent with policies of the Solano County General Plan should be denied by LAFCO except when the inconsistency is not intentional on the part of the County.*

### Recommended Revision: CONSISTENCY WITH COUNTY GENERAL PLAN OF PROPOSED REORGANIZATIONS OUTSIDE OF A CITY'S SPHERE OF INFLUENCE BOUNDARY

An application for annexation to a special district for lands outside an adopted sphere of influence boundary in unincorporated territory shall be denied by LAFCO if the land use proposed within the area of the proposed annexation is not consistent with the Solano County General Plan and Zoning Ordinance. A determination of consistency shall be the responsibility of the County, and shall be met by a resolution of the Board of Supervisors certifying that the proposed annexation meets all applicable consistency requirements of State Law, including internal consistency between the County's General Plan and Zoning Ordinance. This standard shall also be made to apply to proposals for the creation of new special districts and the incorporation of new cities within unincorporated territory which lies outside adopted sphere of influence boundaries.

Explanation. This change is necessary to eliminate the potential for conflict posed by annexations to cities which are inconsistent with the County General Plan and to provide assurance of General Plan and zoning consistency of proposals for expanding or creating development areas outside adopted spheres of influence.

The original standard would have applied as well to annexations to cities. However, there no longer is a requirement in State Planning Law that city and county general plan policies for areas within a city's sphere of influence must be consistent. Under current law, the applicable general plan is of the affected city, except for lands which are not proposed for urbanization by the city's general plan. Where conflicts exist between cities and the county, sound planning practices suggest that the city and county resolve their differences so that the general public is not confused.

Limitation of the standard to reorganizations within unincorporated territory necessarily fills a gap that otherwise would exist in determining the efficacy of expanding or creating new urban development in unincorporated areas beyond a city's sphere of influence.

### Alternative Standard: CONSISTENCY WITH THE COUNTY GENERAL PLAN COVERING ALL PROPOSALS FOR REORGANIZATION WITHIN UNINCORPORATED TERRITORY, BOTH WITHIN AND OUTSIDE ANY GIVEN CITY'S SPHERE OF INFLUENCE

An application for reorganization within unincorporated territory, including annexation to cities or districts, the creation of new districts, or the incorporation of a new city, shall be denied by LAFCO if the proposed reorganization is inconsistent with the Solano County General Plan and Zoning Ordinance. A determination of consistency shall be made by resolution of the Board of Supervisors certifying that the proposed reorganization meets all applicable consistency requirements of State Law, including internal consistency between the County's general plan and zoning ordinance. Conflicts in general plan policy between the County and an affected city shall first be resolved ~~under procedures provided by the State Planning Law~~ before an application for annexation to a city will be reconsidered by LAFCO.

Explanation. This standard encompasses all of the purposes of the recommended standard above, plus annexations to cities which are in conflict with policies of the County General Plan. While cities and counties are no longer required to resolve their differences, the general public is entitled to an exposition of all factors pertinent to a proposed annexation to a city, including the interests of those who currently reside, own land or provide governmental services to the affected lands. The interests of a city may not necessarily coincide with the interests of those of the unincorporated area involved. In a given instance, the Board of Supervisors, upon advice of the County Planning Commission, shall determine whether the proposed annexation is in the best public interest.

Because of the press of business, counties often lag the actions of cities in amending their general plans. Where amendment by the county is anticipated, but has not yet been formally enacted, an application for annexation can be accepted, though not acted upon until formal action of plan amendment by the county.

~~Where clear conflict exists, requiring further discussion and deliberation by the city and the county, the application should not be accepted until the matter is resolved. Under state law, cities and counties are required to cooperate in achieving plan consistency. If necessary, arbitration may be sought or required by the Governor's Office of Planning and Research. Action may even be required by the State Attorney General's Office where the conflict results from a judgment of general plan inadequacy.~~

#### STANDARD NO. 8: LIKELIHOOD OF SIGNIFICANT GROWTH

*An application for annexation shall be accompanied by evidence and analysis of the likelihood of significant growth which will justify the proposed conversion of open-space land to urban use within a ten-year period of time.*

#### Recommended Revision: LIKELIHOOD OF SIGNIFICANT GROWTH

An application for annexation shall be accompanied by evidence and analysis of the likelihood of significant growth which will justify the proposed conversion of open space lands to urban use within a 10 year period of time, based on analysis of local and regional housing demand, and in consideration of the following factors:

1. The amount of land already suitable for the intended uses within the city's boundaries, in accordance with the City's General Plan.
2. Factors which may impede the utilization of vacant land already within the city limits.
3. Options available to the city to eliminate obstacles to in-fill on vacant lands before further extending city boundaries.

The level of detail provided in the market analysis shall be commensurate with the scale and complexity of the proposed development project. Relatively small parcels proposed for residential use which are under 20 acres in area and either adjacent to or wholly or partly surrounded by existing urban development, are excluded from the requirement for market analysis.

An annexation proposal which includes lands substantially in excess of that which reasonably can be expected to convert to urban use within a 10 year period may be approved by LAFCO, provided that the city and project sponsor enter into a development agreement which provides for the phasing and timing of development within a 10 year period in accordance with the housing demand analysis.

Explanation. A broadening of the market analysis to include regional housing demand is essential in determining growth potential within a 10 year period. The addition of factors of land availability within the city limits, factors which impede in-fill, and options for encouraging in-fill are important to avoid the premature annexation of land, pressures for its premature development and pressures and conflicts which would interfere with agricultural operations. The exclusion of parcels less than 20 acres from the requirement is reasonable because of scale and location, and the costs involved. Finally, allowing large-scale annexation which may require 15 or even 20 years to develop under current market expectations may be reasonable as long as the development agreement provides necessary assurances against premature development. Large-scale annexations occasionally are desirable because a property owner is unwilling to sell only a part of his property to a potential developer.

at times

This standard may be one of the more difficult ones to apply with certainty in all cases because of the variables which affect population growth and economic activity within

Solano County. Information is often cited suggesting that proposed annexations are premature with respect to reasonable expectations of population growth, and in consideration of existing residential lots already on the market within the affected city. This argument sharpens the issues upon which LAFCO should focus in applying this standard.

State law requires that each city adopt and maintain a comprehensive general plan, including nine mandatory elements, and including standards of population density and building intensity. Cities are given wide latitude, however, in determining future land use policy and the extent of future growth to be covered by the plan. While one city may have an aggressive growth policy, another may be very conservative as to the rate and extent of population growth it is willing to accommodate.

The factor of the likelihood of significant growth within ten years as imposed on LAFCO by Knox-Nisbet creates new dimension to the process of general plan preparation and maintenance. A city which wants to be aggressive in its growth policies must now justify annexations in the face of realistic growth potential. The burden of proof falls upon the proponent of annexation (including the affected city) to carefully document all of the factors to be considered, including the following.

## What Is Realistic Growth Potential Within Ten Years?

~~Notwithstanding projections of population and employment by ABAC regional banks and the state,~~ Solano County is in a particularly advantageous, as well as vulnerable, position in accommodating population and economic activity. The phenomenon is related more to the northern bay area as a whole than to Solano County. As employment within the greater bay area continues to increase, the area's ability to accommodate housing near major employment centers continues to decrease. Central and West-Central Solano County has been a target for residential, commercial and industrial growth since the early 1970's, and prospects for the 1980's appear sound if economic recovery continues. The low number of housing units constructed in recent years is more a reflection of a recessionary economy and is not typical of what Solano County can expect in the future.

Solano County could well require a much greater number of new housing units than would be generated by only new local industrial and commercial development if people continue to want to live in Solano County but commute to employment centers outside of the county. As a result, the number of available residential lots cannot easily become the definitive basis for determining whether new housing areas should be annexed. As in many other areas of the state, many single-family lots which were created before and during the housing crunch of the 1970's no longer relate realistically to the housing market. The new characteristics of the market are in most cases overwhelmingly oriented toward multi-family, condominium, and other types of housing to meet regional demand rather than toward conventional single-family detached housing.

### The Role of Market Analysis

Given the changed conditions in the housing market, including the unaffordability of single-family, detached homes for the majority of people who desire housing, growth potential should be assessed through competent housing market analysis. ~~Traditionally, such analysis has been done by the private sector. Whether the complete picture can be provided by continued reliance on private analysis is questionable.~~ And yet, the Knox-Nisbet requirement for directing urban growth toward lands already annexed and away from agricultural lands until needed demands a sound basis upon which to render judgment.

For the City of Rio Vista, distance from major metropolitan areas and rates of growth may preclude the need for extensive market analysis as a basis for evaluating annexation proposals. But for Dixon, Vacaville, Fairfield, Fairfield-Cordelia, Suisun City, Benicia and Vallejo, proving market potential over a ten-year period appears reasonable and prudent to avoid premature commitment of lands to urbanization. (Note: A special section is provided for the Cordelia area later in this report because of its unique land use and growth management policy base.)

It is important to note also that some cities in the county already serve as residential communities rather than fully-balanced residential and employment centers. Suisun City is somewhat subservient in this regard to Fairfield; Benicia and Dixon have a high proportion of commuter housing for their size; and even Fairfield and Vacaville house fairly high percentages of commuter households.

This position in the regional housing market poses a dilemma. Sonoma<sup>Central</sup> and Solano Counties are vitually the last remaining areas where north bay area population can be accommodated at any scale. Substantial growth in Napa, Marin, San Francisco, Alameda and San Mateo Counties has been precluded by high land cost, unavailability of land, or by local land use policies which seek increases in employment but not housing or which seek to preserve the environment as it is.

This raises fundamental issues for Solano County and its cities. As of now, the answers rest with each community as to how much they want to grow given conditions of a regional housing market which will support growth. In the absence of solutions on a broad regional scale which seek equity in the location of employment centers in convenient relation to housing need, market analysis becomes essential to understanding growth potential.

#### STANDARD NO. 9: PROTECTION OF PRIME AGRICULTURAL LAND

*Urban growth shall be guided away from prime agricultural land, unless such action would not promote planned, orderly and efficient development for the city. Development of existing vacant or non-prime agricultural lands within the city limits should be encouraged before any proposal is approved for urbanization outside of the city limits.*

Recommended Revision: (to be added onto original standard above)

An annexation is considered to guide development away from prime agricultural land when:

1. It does not contain prime agricultural land rated as Class I or II under the soil classification system of the US Soil Conservation Service, or has a rating of 80-100 in the Storie soil classification Index.
2. It does not contain a commercial livestock operation.
3. The area is wholly or partly surrounded by existing urban development.
4. Less than 25% of the area is rated as Class I or II as under item 1, above, out of a total of less than 100 acres.

An annexation is considered to promote the planned, orderly and efficient development of an area when:

1. The proposed annexation either abuts a developed portion of the city or abuts properties which already are committed to urban development by the extension of utilities, drainageways, streets and other public facilities where service extensions were predicated on adjacent lands within the proposed annexation area being developed to assist in meeting public or private financial obligations to pay off bonds or other financial instruments against the property.

2. The area would cause improved levels of public services to adjacent areas or areas in the immediately vicinity which have already been developed for urban use.
3. That it can be demonstrated that there are insufficient vacant lands zoned for the same or similar purposes already within the city limits because of one or more of the following factors which seriously impede the utilization of vacant land:
  - a. Where land is unavailable at a reasonable market rate as determined by competent market analysis.
  - b. Where insufficient land is currently available for the type of land use proposed, as determined by competent market analysis.
  - c. Where surrounding land use clearly ~~is~~ incompatible because of of the age and condition of structures or mixture of land use.

Notwithstanding the factors listed under item 3, above, it is the responsibility of a city to undertake substantial actions to facilitate and encourage the in-fill of land within a city limits so as to minimize the need for further annexation. Such actions include, but are not limited to, the following:

1. Redevelopment plans and actions programs
2. Capital improvement programs
3. Changes in land use policies and regulations
4. Housing programs, including rehabilitation

Explanation. The additions and changes to the original text are proposed to provide a more detailed base for determining productive agricultural operations, and the conditions which may permit exception to the requirement of the Knox-Nisbet Act to assure planned, orderly and efficient growth, and to encourage greater utilization of vacant lands within a city's boundaries.

Alternative Standard: (to be added onto original standard No. 9)

Annexation shall be prohibited on land under an agricultural contract. A determination that planned, efficient and orderly growth would be adversely affected shall be certified by resolution of the City Council, including substantial evidence that the city is now or is committed to instituting programs to encourage in-fill of vacant lands within the city to overcome factors which impede their development.

Explanation. This alternative is not intended to stand alone, but would be incorporated into the Recommended Revision described above.

This standard goes to the heart of a major objective of Knox-Nisbet. To make the first sentence of the standard operative, there has to be a finding as to what "planned, orderly and efficient development" means for each city. ~~Since conditions will vary, reasonable consideration should be given to the following:~~

- ~~1. Proposals shall be consistent with general plan policy (see Standard Nos. 3 - 5).~~
- ~~2. Proposals shall be capable of being served by the full range of urban services required (see Standard No. 8) to the city.~~
- ~~3. Proposals are supported by competent market analysis (see Standard No. 6) to the city.~~

The second part of the standard is permissive, in that it encourages rather than mandates the development of vacant or non-prime land already within the city limits before pushing outward into unincorporated territory.

### **Guiding Development Away from Prime Agricultural Land**

Before adoption of the Municipal Reorganization Act (MORGA) in 1977, the Legislature had defined prime agricultural land in Knox-Nisbet as those lands rated as Class I or Class II under the soil classification system of the U. S. Soil Conservation Service, or which had a rating of 80 to 100 in the Storie Index. MORGA broadened the definition affecting LAFCO decisions, to include "... any land which is used to maintain livestock for commercial purposes," and certain lands which have an unprocessed plant production of not less than \$200 per year.

Impetus for this change in definition came in part from commercial cattle operations in foothill areas of the state, where encroachment by second-home subdivisions and other recreation-oriented development was creating problems of property damage and loss of cattle through vandalism. By potentially extending this new definition to all grazing land, confusion is introduced as to whether the land in question truly ranks as a viable commercial operation. It also tends to limit cities in seeking to develop Class IV - VI land (which has little capability for anything but grazing in most regions of the state) as a trade-off to protect prime lands in Classes I and II. This very kind of trade-off was important in developing policies for the Cordelia area. In this case, most of the lands in Suisun and Green Valleys were protected for continued agricultural production in exchange for using less productive grazing land along the west side of Interstate 680. Those lands within lower reaches of Suisun and Green Valleys within the Cordelia Urban Limit Line were designated urban in order to promote an orderly and efficient development pattern, and to solve problems of flooding and other resource management needs along lower reaches of Green Valley and Dan Wilson Creeks.

### **Maintaining the Integrity of Lands Within Agricultural Preserves**

Lands included within agricultural preserves under the Williamson Act are to be protected except where land is proposed by the General Plan for eventual urbanization and where the owner has already filed for removal under the ten-year clause, or where cities officially protested inclusion of land under the Williamson Act within their spheres of influence. In the former situation, lands withdrawn by petition of a landowner starts a ten-year period when removal is complete, unless penalty tax payments are made for earlier removal and other requirements for contract cancellation are met. Under the latter situation, lands protested for inclusion in an agricultural preserve by a city cease to be a part of the preserve upon annexation.

Maintaining the "integrity" of agricultural preserve lands can only be construed as furthering the purposes of Knox-Nisbet to avoid the premature conversion of prime agricultural lands to urban purposes. And even though a given application for annexation may qualify under the ten-year filing clause for removal, or by a prior protest of the neighboring city, LAFCO must evaluate the potential effect of a proposed annexation on neighboring lands within agricultural preserves to avoid premature pressure for the conversion of such lands to urban use.

### Encouraging In-Fill Development

This Knox-Nisbet policy calls for "in-fill" on vacant lands within municipal boundaries before extending further out into agricultural areas. This policy is fraught with problems where one or more of the following conditions may exist:

1. Where owners of in-fill property are not willing to sell at a reasonable market rate.
2. Where too many recorded lots for single-family housing exist in relation to realistic market demands for all housing types.
3. Where available property is too small in area to accommodate long-term building objectives of the developer.
4. Where surrounding land use may be incompatible.
5. Where surrounding older housing reflects a deteriorating environment.
6. Where surrounding established single-family areas object to the higher densities often necessary to justify in-fill investment.
7. Where physical amenities of site location are too limited or non-existent to justify high-priced housing.

An absolute requirement for in-fill can have a devastating impact through artificial increases in land values and, in effect, can even stop growth. Conversely, where adequate parcels and lots exist to meet reasonable demands of the housing market for the range of housing types required, in-fill can be achieved to some extent. It has been a long standing policy of many cities in California to provide a "cushion" of additional acreage to meet future urban needs where the above conditions may exist.

Through adoption of state planning law and CEQA, the Legislature has made it clear that abuse in planning which continually pressures for the conversion of prime agricultural land to urban use is not to be tolerated. At the same time, however, escape valves have been provided to allow assessment of conditions in the real world and reasoned decisions based on those conditions. To conclude otherwise, little opportunity would exist for cities to expand and grow throughout the entire state.

### The Case for the Large-Scale Developer

During the past decade, many small-scale developers have left the field because of the complexities and costs involved. The sophistication required to survive in the field of private urban development has driven many small-scale entrepreneurs to other endeavors. One of the factors involved, besides know-how, is the financial capacity and assurance of being able to develop over a long period of time. In real estate parlance, this is often referred to as "land-banking." However, only recently has the Legislature recognized this legitimate aim and the necessity for developers to be free of worry that municipal policy may be changed after investment commitment.

State Planning Law now provides for a developer and city to enter into a "development agreement" to assure long-term capability to develop property without being affected by later changes in city policy. Where large-scale and long-term projects are proposed through annexation, LAFCO should seriously consider requiring development agreements between the developer and the city. With respect to the purposes of Knox-Nisbet, key provisions would cover:

1. Phasing of development over a 5-10 year period in keeping with reasonable analysis of the market for new housing or other urban use consistent with policies of the General Plan.
2. Reasonable phasing to avoid premature conversion of prime agricultural lands to urban use.
3. Reasonable phasing which will assure city capability to provide urban services required without negative financial impact upon existing property owners and residents of the city.

In return for such concessions, the developer is assured that municipal policy will not change as it relates to his project without his prior consent in writing and amendment of the basic ordinance adopting the agreement.

## STANDARD NO. 10: PROVISION AND COST OF COMMUNITY SERVICES

*Annexation proposals shall be accompanied by a service delivery plan detailing availability of and methods of provision for the full range of municipal (and school) services. The plan shall include analysis of the costs of providing these services and how these costs are to be off-set without adverse financial impact on the service agency. The service delivery plan shall first identify the types of services needed, their present and projected availability and costs over the period in which development will occur, the probable impact of providing the services on other undeveloped lands in the vicinity, and how any current deficiencies in service levels may be overcome or improved by the project.*

### Recommended Revision: PROVISION AND COST OF COMMUNITY SERVICES

Annexation proposals shall be accompanied by a service delivery plan indicating the availability of and methods of providing for the full range of services, including schools, required to serve the area, the probable costs of such services and proposed methods of financing. This requirement for availability and cost analysis can be satisfied by a "will serve" verification provided by the affected city.

Explanation. The affected city is best able to determine and verify capability to provide necessary municipal services. Where existing data is lacking, further analysis by the project sponsor would be required to enable the city to issue a "will serve" verification to L.A.C.

The purpose of this standard is to provide a realistic appraisal of the availability and costs for services for a proposed development. A sophisticated system of costing a project is not required, but it should cover the full range of service impacts which will occur. The range of services to be analyzed includes water supply, sewage disposal, drainage, flood control, street improvements, park and recreation facilities, schools, fire and police protection, refuse disposal, street sweeping, and any other services which a given city normally provides to its residents.

Since an annexation proposal normally does not include detailed plans for property development, a concept plan should be provided as a minimum for determining the probable costs of public works required. Costs should be estimated and projected in current dollars, and should be compared with financial contributions proposed by the applicant together with anticipated revenues which would accrue to the city through property taxes and other taxes to be generated.

As noted under Standard No. 9, provision for assuring that large scale projects will pay their own way should be made part of a development agreement, including on and off-site improvement, payment of special fees to provide recreation and school facilities (if needed), and other forms of financial contribution which may be offered or required. Special attention should be given to showing what improvements and services will be provided for each phase of development to assure that services needed in early phases are not dependent on financial contributions to be made in a later phase which may never take place. Alternative ways in which to provide certain services at lower cost for improvements and for on-going maintenance and operation should be considered where appropriate. The evaluation of alternatives may be particularly important where costs of providing services on a conventional basis may be lowered through innovation in design.

**STANDARD NO. 11: THE EFFECT OF THE PORPOSED ACTION ON ADJACENT AREAS, MUTUAL SOCIAL AND ECONOMIC INTERESTS AND ON LOCAL GOVERNMENTAL STRUCTURE**

*The application shall describe the positive and negative effects which the annexation could have on adjacent areas within and outside the city. It shall also describe any social and economic benefits which will accrue to the city and other affected units of local government such as special districts, a neighboring city, and the County.*

**Recommended Revision: THE EFFECT OF THE PROPOSED ACTION ON ADJACENT AREAS, MUTUAL SOCIAL AND ECONOMIC INTERESTS, AND ON LOCAL GOVERNMENTAL STRUCTURE**

The application shall describe the effects which the annexation could have on adjacent areas within and outside the city. It shall also describe any social and economic benefits which will accrue to the city and other affected units of local government such as special districts, a neighboring city, and the County.

This standard responds to the Knox-Nisbet factor listed under Paragraph (c) in PART 2 of this report. As worded in the law, the factor is somewhat vague and tends to overlap with the purposes of several other standards, including those pertaining to the protection of agricultural land, meeting needs of the housing market, orderly growth and the provision of urban services. Consequently, meeting this standard requires placing in perspective the overall beneficial consequences of a proposal as compared to potential negative impacts, through qualitative analysis.

Examples of mutual social and economic benefits are the provision of low-moderate income housing, the provision of commercial areas where existing commercial development does not meet needs of residents, the creation of new employment opportunities to meet the needs of unemployed or under-employed, protecting sensitive resources, advancing the time when public improvements needed by the larger community may be provided, and improving levels of service within the community without incurring additional costs.

These types of benefits may, in a given case, argue for a project as off-setting negative consequences identified in responding to other standards.

#### STANDARD NO. 12: EFFECT ON NATURAL RESOURCES

*An application for annexation shall describe the amount of land area involved, and the land, water, air and biological resources affected, including topography, slope, geology, soils, natural drainages, vegetative cover and plant and animal populations. Effects to be covered include those which will be both positive and negative, and the means proposed to off-set potential negative impact.*

Recommended Revision: (to be added onto original standard above)

LAFCO shall certify that provisions of the Solano County Environmental Guidelines and Guidelines for the Implementation of the California Environmental Quality Act have been complied with.

This standard may already be reflected in studies provided as part of a city's general plan and is akin to the analysis of impacts and mitigation measures which ordinarily are revealed in an environmental assessment or environmental impact report. As a responsible agency under CEQA for city-initiated annexations, LAFCO may use such other documentation unless it is determined that environmental information critical to the decision at hand has not been adequately presented. In that case, the LAFCO may require additional information prior to action on the annexations.

CEQA requires the decision maker to balance the benefits of a proposed project against its unavoidable environmental risks in determining whether to approve a project. In accordance with CEQA Guidelines Section 15091, the LAFCO shall not approve or carry out a project for which an environmental impact report has been completed which identifies one or more significant

effects of the project unless the LAFCO makes one or more of the following written findings for each of those significant effects, accompanied by a statement of the facts supporting each finding.

- (a)
  - (1) Changes or alterations have been required in, or incorporated into, the project which mitigate or avoid the significant environmental effects thereof as identified in the final EIR.
  - (2) Such changes or alterations are within the responsibility and jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by such other agency or can and should be adopted by such other agency.
  - (3) Specific economic, social, or other considerations make infeasible the mitigation measures or project alternatives identified in the final EIR.
- (b) The findings required by subsection (a) shall be supported by substantial evidence in the record.
- (c) The finding in subsection (a)(2) shall not be made if the agency making the finding has concurrent jurisdiction with another agency to deal with identified feasible mitigation measures or alternatives.
- (d) A public agency shall not approve or carry out a project as proposed unless the significant environmental effects have been reduced to an acceptable level.
- (e) As used in this Section, the term "acceptable level" means that:
  - (1) All significant environmental effects that can feasibly be avoided have been eliminated or substantially lessened as determined through findings as described in subsection (a), and
  - (2) Any remaining, unavoidable significant effects have been found acceptable under Section 15092.

CEQA Guidelines Section 15092 stipulates that:

- (b) Where the decision of the public agency allows the occurrence of significant effects identified in the final EIR without mitigation, the agency must state in writing the reasons to support its action based on the final EIR and other information in the record. This statement may be necessary if the agency also makes a finding under Section 15088(b) or (c).

- (c) If an agency makes a statement of overriding considerations, the statement should be included in the record of the project approval and should be mentioned in the Notice of Determination.

STANDARD NO. 13: FACTORS FAVORABLE TO APPROVAL OF ANNEXATION

- DELETE
1. The proposal would not create islands, near-islands, or other gross distortion of existing city limits.
  2. The boundaries of the proposal include appropriate areas and are otherwise properly drawn.
  3. The proposal is consistent with the affected city's sphere of influence.
  4. The proposal is consistent with the affected city's general plan or specific plan.
  5. The area proposed for annexation has been rezoned by the affected city in conformance with its general plan or specific plan.
  6. The proposed area has total population and population density requiring municipal or urban type services.
  7. The proposed area is not presently urban in character but, consistent with adopted plans, is expected to be so within ten years.
  8. The proposed area is in close proximity to the developed portion of the city and would be a logical extension of city growth.
  9. The proposal guides development away from prime agricultural soil, unless such action would not promote planned, orderly and efficient development for the city.
  10. The proposal can be served by the full range of municipal (and school) services without adverse financial impact on the service agencies.
  11. The assessed valuation is, or is expected to be, sufficient in relation to anticipated costs and revenue of development to make incorporation financially feasible.
  12. The proposal appears not to be motivated by inner-city rivalry, land speculation, or other motives not in the public interest and will create no significant negative social or economic effects on the County or neighboring cities.
  13. The proposed area is environmentally suitable for urban development with consideration given to topography, natural boundaries, and drainage areas. Potential adverse effects can be mitigated below the level of significance.

Recommended Revision: DELETE

Explanation. The key provisions have been included in other standards

## Special Considerations for the Cordelia Area of Fairfield

The Cordelia Area of the City of Fairfield requires special consideration because of policies of the Cordelia Area Specific Plan adopted by the City in December, 1974. The Specific Plan was the product of several years work in determining land use policy as well as the best way to manage development by local government. Early studies completed as part of the West Central Solano County General Plan examined various options for governmental management in Cordelia, including retaining County responsibility, formation of a County Service Area, incorporation, or annexation to Fairfield. It was agreed by Fairfield and Solano County that annexation to Fairfield was most feasible. With this decision, the West Central Solano County General Plan (and EIR) and the Cordelia Area Specific Plan (and EIR) were completed. The City initiated steps to annex a major part of the area for early development.

The Cordelia growth center, while a part of the City of Fairfield, was designated a new town, with different policies on growth management, infrastructure and annexation than those applied to the remainder of Fairfield. Cordelia growth was to be managed in accordance with the Specific Plan to achieve a new community of up to 41,000 people. The Plan established an Urban Limit Line as a precise boundary for urbanization so as to protect agricultural lands of Suisun Valley and Green Valley. A trade-off was developed which would save these productive valley agricultural lands from further urbanization in exchange for designating less productive grazing lands for urban use. As an absolute boundary to urban growth, the Specific Plan recommends that LAFCO adopt a Sphere of Influence coterminous with the Urban Limit Line.

The Specific Plan also established a System of Financial Accounts to assure reasonable balance in the creation of jobs and new housing. This policy was based on the fact that Cordelia has great potential for regional industrial and commercial development. Thus, new housing was to be allowed only to the extent that new jobs were created; the objective was to avoid creating a bedroom community dependent on jobs elsewhere. As long as this objective was met, and public facilities and services were made available to the Cordelia growth center, no specific limits were placed on the rate of growth or urban expansion to the Urban Limit Line.

The Specific Plan also contains policies governing the annexation process for Cordelia. The initial annexation by Fairfield involved approximately 3,000 acres. The Plan makes it clear, however, that all of the land within the Urban Limit Line is to be annexed as soon as possible to achieve goals of the Plan.

The above discussion is an additional dimension for annexation proposals in the Cordelia Area different from the application of standards to the balance of Fairfield. While standards in this report apply to both growth centers, growth management policies from the Specific Plan must also be examined for Cordelia.

When considering an annexation proposal to the Cordelia growth center, for example, the number of lots and housing sites approved for Cordelia only should be of primary importance when analyzing the likelihood of significant growth (Standard No. 8), as long as the policies on growth management within the Specific Plan are met. The key policy for Cordelia is that growth be in balance with economic benefits. If the economics of growth are met, full development of the Cordelia Area by 1990, as envisioned by the Specific Plan, may yet occur, regardless of growth and development factors which may occur elsewhere in the County.

## PART 4: RECOMMENDED PROCEDURES

The Standards within this report provide the framework for future actions by LAFCO and annexation applicants. Further work is recommended in order to incorporate the Standards in a revised annexation application and to make available background information within this report as a guide to completing applications.

### Procedural Guide

Following adoption of the Standards, LAFCO should prepare a procedural guide for handout to all cities, special districts and applicants outlining the steps and documentation required for LAFCO action. The Procedural Guide should contain, as a minimum:

- a. An introduction briefly describing the legislative mandate for and purpose and objectives of the LAFCO.
- b. A brief discussion of the annexation process including the responsibilities of the individual cities, districts and the Local Agency Formation Commission. This section should also address Spheres of Influence and the environmental review process.
- c. A statement of LAFCO Standards. The Standards within this report were prepared to respond to factors within Knox-Nisbet and do not necessarily address all the administrative guidelines with which LAFCO may be legitimately concerned. For example, Standard No. 1 requires, among other things, legal descriptions based on established ownership assessment boundaries and a map showing proximity to populated areas. The Standard does not detail criteria for drawing the boundaries (i.e. should the annexation boundary follow the center of a roadway or include the entire ultimate roadway width for uniform development standards), nor has the type of map and desired scale been determined.

These administrative guidelines may also include application procedures and fees, public hearing schedules, minimum time frames for accepting documentation prior to public hearings, and requirements from the Standards which may be processed concurrently with the annexation application, such as general plan amendment and rezoning.

- d. A summary of the explanatory statement with each Standard. The discussion of each Standard in this report is important for understanding the implication of each and for providing guidance to applicants to

satisfactorily respond to requirements. Members of the Commission will also benefit as they review each project based on its own merit in conformance with the Standards.

- e. The annexation application and Solano County environmental assessment (Initial Study) questionnaire. The application should incorporate Standard requirements as discussed below; the Initial Study and environmental determination will be necessary except in cases where previous environmental documentation exists.

The Procedural Guide should be as brief as possible yet comprehensive enough to include the above components. There must also be provision for updating the Guide as conditions warrant.

### Annexation Application

A revised annexation application should be prepared in accordance with newly adopted Standards. Many of the Standards lend themselves to direct question; others require interpretation by LAFCO staff. In the first instance, Standard No. 4, for example, requires consistency of the proposal with a city's general plan. This determination can usually be made rather easily. If a proposal is not consistent, then a general plan amendment must be processed by the affected city prior to LAFCO action. In the second instance, more detailed information is required as is the case with Standards No. 1, 8, 9, 10, 11, and 12. While a uniform format for providing documentation is not recommended, each city and applicant should be made aware that incomplete or insufficient information could be ground for LAFCO denial.

A differentiation needs to be made between small scale and large scale projects. For the majority of annexation proposals, responding to the Standards will be relatively simple and based on data provided the applicant by the city involved. It is recommended that each city which expects a larger volume of annexation activity prepare a Master Service Delivery Plan for approval by LAFCO. The Master Service Delivery Plan should include:

- a. A brief analysis of municipal services within its Urban Limit Line. The analysis can be based on current general plan policy, capital improvement plans, and individual department procedures. It should outline service availability and methods of providing necessary improvements.
- b. Certification by the city that its general plan is internally consistent, and that its zoning ordinance

is also consistent with the general plan.

- c. A summary of the potential significant environmental effects of planned growth and how these effects can be mitigated.

The Master Service Delivery Plan, based primarily on existing information will not only provide much of the documentation required in the application, but it will allow LAFCO to expedite the annexation process.

Large scale projects, that is those that propose a Sphere of Influence Boundary Change, a general plan amendment or require extensive environmental documentation are not expected to be covered under the Master Service Delivery Plan. These large scale projects must provide original documentation as suggested in discussion following each Standard.

**APPENDIX F**

**Cullinan Ranch Boundary and Exchange Agreement, July 11, 1974**

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Recorded at the request of  
State of California  
State Lands Commission

WHEN RECORDED mail to:  
State Lands Division  
1000 L Street  
Sacramento, California 95814

STATE OF CALIFORNIA  
OFFICIAL BUSINESS - Document  
entitled to free recordation  
pursuant to Government Code  
Section 6103

S.L.C. No. W 8848

NO TAX DUE

DOCUMENT  
CLEARING STATE  
LANDS PROJECT  
TITLE TO  
PREVIOUS OWNER  
see developer  
comment

ELEANOR E. KIMBROUGH  
COUNTY RECORDER

RECEIVED  
JUL 11 1974

STATE LANDS DIVISION

Above space for Recorder's Use

CULLINAN RANCH BOUNDARY AND EXCHANGE AGREEMENT

B.L.A. 142

THE PARTIES TO THIS AGREEMENT, dated APRIL 17 1974  
are the STATE OF CALIFORNIA, acting by and through the STATE LANDS  
COMMISSION, hereinafter referred to as STATE, and MAURICE CULLINAN  
and MILDRED CULLINAN, his wife; G. JACQUELINE CULLINAN, also known  
as G. JACQUELINE CULLINAN, as her separate property; and G.  
JACQUELINE CULLINAN, as Trustee of the Trust created by the Will of  
Martin Cullinan, Deceased (Sonoma County Probate Case No. 32337),  
as their interest appears of record; ROYAL LAND CORPORATION, a  
California corporation, and WILLIAM DESMOND RYAN, individually;  
hereinafter collectively referred to as SECOND PARTY without regard  
to number or gender.

W I T N E S S E T H:

WHEREAS, the State of California, by virtue of its  
sovereignty, received title to sovereign tide and submerged  
lands located within said State at the time of its admission

to the Union and subsequently received title to swamp and overflowed lands from the United States of America by virtue of the Swamp Lands Act of 1850 (43 U.S.C. § 981 et seq.) and the jurisdiction over and administration of all said lands was and is vested in State Lands as the successor in interest of all previous State agencies having such jurisdiction and administrative powers;

WHEREAS, although all of the lands affected by this agreement are swamp and overflowed lands or sovereign tide or submerged lands, the parties hereto are not in agreement as to the extent and amount of each category of such lands (or the present legal effect upon the title to such lands by virtue of falling into such a category) within the area affected by this agreement;

WHEREAS, those certain navigable waterways partially in the County of Napa and partially in the County of Solano, commonly known as Dutchman Slough and South Slough, in T. 3 N., R. 4 W., and in T. 4 N., R. 4 W., M.D.M., as the same are bounded by the line of the ordinary high water mark hereinafter described and referred to as "SAID ORDINARY HIGH WATER MARK", such waterways being hereinafter referred to as "SAID WATERWAY", were at the time of the admission of the State of California as a State of the United States of America, and at all times thereafter have been tidal and navigable waters within the State of California and said counties, and as such, the SAID WATERWAY consists of tide lands and submerged lands owned by the STATE OF CALIFORNIA in its sovereign capacity; and

WHEREAS, certain lands adjoining SAID WATERWAY, herein-after referred to as SAID UPLANDS, consisted of a portion of the land included within those certain STATE Swamp and Overflowed Land patents to John W. Pearson, recorded in the office of the Napa County Recorder on June 12, 1900, in Book D of Patents at page 430; and to John W. Pearson, recorded in the office of the Solano County Recorder on May 1, 1874, in Book 3 of Patents at page 301; and to John W. Pearson, recorded in the office of the Napa County Recorder on May 2, 1874, in Book A of Patents at page 388; and

WHEREAS, the total of the lands described in said patents were identified therein as Swamp and Overflowed Surveys No. 569, Solano County, and No. 115, Napa County; and

WHEREAS, SECOND PARTY is the successor in interest to all private title created by virtue of such Swamp and Overflowed Surveys within the areas affected by this agreement.

WHEREAS, SECOND PARTY contends that said patents conveyed to the private patentee fee simple absolute title free of any reservations in the State to all lands included within the perimeter descriptions described in said patents (also including the area included within SAID WATERWAY) affected by this agreement; and STATE contends that the patents conveyed fee simple absolute title only to the swamp and overflowed lands included within said descriptions; and the parties are in a good faith and bona fide dispute concerning the contentions of STATE which cannot be settled in the absence of agreement or litigation with its attendant costs, delays and uncertainties.

WHEREAS, it appears that the line of mean high tide of Dutchman and South Sloughs (SAID WATERWAY) since 1850 has been subject to fluctuations, the nature, extent, and causes of which are the subject of substantial uncertainty and bona fide dispute; and

WHEREAS, the SAID ORDINARY HIGH WATER MARK constitutes the common boundary between the SAID UPLANDS of the SECOND PARTY and the said tide lands and submerged lands of the STATE, which boundary is located at the line of mean high tide as it naturally existed, and which boundary does not necessarily coincide with the present line of mean high tide by reason of artificial and avulsive changes in the location of the mean high tide line which have occurred; and

WHEREAS, the true location of the boundary between the lands of STATE and SECOND PARTY, being the SAID ORDINARY HIGH WATER MARK, is not known and cannot be established without agreement or court judgment; and

WHEREAS, the parties hereto deem it expedient and necessary and in their respective interests, and they mutually desire to permanently fix and establish by this agreement the location of SAID ORDINARY HIGH WATER MARK, and thereby their boundary at and along the line herein referred to as the "AGREED BOUNDARY LINE", and to clarify and confirm STATE'S title within SAID WATERWAY; and

WHEREAS, Section 6357 of the Public Resources Code of the STATE OF CALIFORNIA authorizes the STATE LANDS COMMISSION to establish the ordinary high water mark of tidelands or submerged lands of this STATE by agreement, arbitration, or action to quiet title, whenever it is deemed expedient or necessary; and

WHEREAS, the SAID UPLANDS are completely separated by levees from the tidal waters of SAID WATERWAY and other adjacent waterways and have been filled and reclaimed and have been used for many years for agricultural purposes; and

WHEREAS, the parties acknowledge that the existence, extent, nature, location, and area of the public rights excepted and reserved from said Patents over the SAID UPLANDS depend upon uncertain issues of fact and law which are the subject of considerable uncertainty and a bona fide dispute between the parties; and

WHEREAS, the parties wish to define the extent, nature, location and area of such public rights by compromise settlement as part of and incidental to the establishment of the AGREED BOUNDARY LINE to avoid the costs and uncertainties of litigation, by an exchange of interests within SAID UPLANDS wherein SECOND PARTY shall convey certain portions thereof to STATE (or other lands as hereinafter set forth) in exchange for the STATE'S quitclaim to SECOND PARTY of its right, title, and interest, if any, in the remainder of the SAID UPLANDS; and

WHEREAS, by virtue of exchange the STATE will obtain dedicated public access to and along SAID WATERWAY, together with contiguous upland parcels for public use; and the STATE LANDS COMMISSION, pursuant to the provisions of Section 6307, Public Resources Code, is authorized to enter into such an exchange; THEREFORE, the parties mutually agree as follows:

1. The location of the boundary between the lands of STATE and SECOND PARTY, being the SAID ORDINARY HIGH WATER MARK, is

hereby permanently fixed, established and located along that certain fixed line as the AGREED BOUNDARY LINE, hereinafter referred to as SAID AGREED BOUNDARY LINE, SAID AGREED BOUNDARY LINE extends an approximate distance of 5.4 miles along SAID WATERWAY and being along the Northerly Ranch Boundary Line between Ranch Boundary Point "A" and Ranch Boundary Point "B", as said line is shown on that certain RECORD OF SURVEY MAP attached to this agreement as Exhibit A and incorporated herein by reference thereto, said survey map hereinafter referred to as "SAID RECORD OF SURVEY." SAID RECORD OF SURVEY is to be recorded in the Book of Surveys in the offices of the County Recorder of Napa and Solano Counties as provided for by this agreement, paragraph 17, infra.

2. The SAID ORDINARY HIGH WATER MARK, the location of which is herein agreed to, and being SAID AGREED BOUNDARY LINE, depicts the location of the boundary between the STATE'S ownership in its sovereign capacity of the tide lands and submerged lands within SAID WATERWAY and the SAID UPLANDS.
3. SAID AGREED BOUNDARY LINE hereby agreed to as the parties' boundary is not intended as a meander line. It is intended as a fixed, permanent and certain boundary line according to the courses and distances as shown in the SAID RECORD OF SURVEY as the NORTHERLY RANCH BOUNDARY LINE.
4. In furtherance of the parties' establishment of SAID AGREED BOUNDARY LINE, SECOND PARTY shall grant transfer, assign, and quitclaim to STATE, by grant deed in a form acceptable to

STATE as provided in paragraph 17, infra, any and all its right, title, and interest in that certain real property in the Counties of Napa and Solano, State of California, more particularly described as that parcel of real property bounded as follows: by SAID AGREED BOUNDARY LINE; by the opposite (general northerly) bank of SAID WATERWAY; by the projection waterward to said opposite bank from Ranch Boundary Point "A" of the WESTERLY RANCH BOUNDARY LINE as said point and line are shown on SAID RECORD OF SURVEY; and by the projection waterward to said opposite bank from Ranch Boundary Point "B" of the EASTERLY RANCH BOUNDARY LINE as said point and line are shown on SAID RECORD OF SURVEY (said parcel including the lands commonly known as Williams Island), together with all right, title, and interest in the lands within T. 3 N., R. 4 W., and T. 4 N., R. 4 W., M.D.M., which were reserved, excepted from, or not included in that certain deed from Maurice Cullinan, et al., to S. J. Pringle, dated September 25, 1951, recorded with the Recorder of Napa County on October 4, 1951, in Book 374 of Official Records, at page 138, and recorded with the Recorder of Solano County on October 3, 1951, in Book 594 of Official Records, at page 462.

EXCEPTING AND RESERVING to SECOND PARTY THEREFROM, the right, if any, to repair or maintain the existing levees within the lands described as Parcel 2 in that certain deed from Maurice Cullinan, et al., to S. J. Pringle, dated September 25, 1951, recorded with the County Recorder of Napa County on October 4, 1951, in Book 374 of Official Records, at page 138, and recorded with the County Recorder of Solano County on October 3, 1951, in Book 594 of Official Records, at page 462,

and in that certain deed from S. J. Pringle to Leslie Salt Company, dated October 24, 1951, recorded with the County Recorder of Solano County on May 28, 1952, in Book 623 of Official Records, at page 528. STATE shall have no liability or responsibility whatsoever for any damages, injuries, causes of action, or otherwise, resulting now or hereafter from any defect in the levees within the hereinabove described lands. However, STATE'S disclaimer of liability shall not constitute any expression on the part of STATE as to the extent or location of STATE interest therein, if any, or waiver thereof.

5. STATE shall transfer, assign, and quitclaim, by patent as provided in paragraph 17, to SECOND PARTY, any and all its right, title, and interest in that portion of SAID UPLANDS (bounded on the north by and being generally southerly of the agreed line of SAID ORDINARY HIGH WATER MARK) more particularly described as Parcel E as shown on SAID RECORD OF SURVEY, said Parcel E is so described in the form of patent attached to this agreement as Exhibit B and incorporated herein by reference.

Excepting and reserving therefrom the following:

- (a) Public Road Easements A and B, as shown on SAID RECORD OF SURVEY;
- (b) Public Water Access Easement A, as shown by SAID RECORD OF SURVEY;
- (c) Any and all right, title, and interest of the State of California, held for State highway purposes under

the jurisdiction of the California State Department of Transportation;

- (d) The public trust easement for the purposes of commerce, navigation, and fisheries over and across any portions of the lands within a 19 foot wide strip lying adjacent and southerly of SAID AGREED BOUNDARY LINE which may be now covered or which may hereafter be covered by the waters of said Dutchman and South Sloughs.

6. As further consideration for this agreement, SECOND PARTY shall grant to STATE, by deed as provided in paragraph 17, infra, any and all its right, title, and interest in that certain real property in the Counties of Solano and Napa, State of California, as shown on SAID RECORD OF SURVEY as Parcels A, B, C, and D, such parcels are hereinafter referred to individually as SAID PARCEL A; SAID PARCEL B; SAID PARCEL C; and SAID PARCEL D; respectively.

EXCEPTING AND RESERVING to SECOND PARTY THEREFROM, a non-exclusive easement and right of way on, over, and across SAID PARCEL A; SAID PARCEL B; SAID PARCEL C; and SAID PARCEL D, for that portion lying within a 100-foot wide strip contiguous to and generally southerly along SAID AGREED BOUNDARY LINE for the purposes of maintenance, repair, alteration, rebuilding, reconstruction, or improvement of the existing levees lying generally southerly of SAID WATERWAY. Such activities, relating to the 100 foot wide strip, shall be performed by SECOND PARTY in a reasonable time and manner so

as not to unduly interfere with STATE'S use and enjoyment of SAID PARCEL A, SAID PARCEL B, SAID PARCEL C, and SAID PARCEL D. STATE shall have no liability or responsibility whatever for any damages, injuries, causes of action or otherwise, resulting now or hereafter from any defect of the levees within SAID PARCEL A, SAID PARCEL B, SAID PARCEL C, and SAID PARCEL D, including but not limited to their condition, state of repair or maintenance, relocation, state of development, design, height, weakness or any other defect whatsoever, and SECOND PARTY hereby waives any claims, demands, or causes of action against State therefor, and agrees to indemnify and hold and save the State harmless from any such claims, demands, or causes of action of SECOND PARTY, their successors in interest, or any other persons or entities, EXCEPT, HOWEVER, the foregoing shall not apply and SECOND PARTY shall not be liable for any claims, demands, causes of action, holding harmless, or indemnity, to any persons or entities for damages or injuries resulting from any failure of the STATE to make necessary repairs of damage to the levees of which STATE has actual knowledge of damage caused thereto by STATE use of SAID PARCEL A; SAID PARCEL B; SAID PARCEL C; and SAID PARCEL D; or upon STATE'S failure to make such necessary repairs within a reasonable time from written notice by SECOND PARTY to STATE of the need for such repair.

- 7 There is EXCEPTED AND RESERVED from the 100-foot wide strip for levee maintenance purposes hereinabove discussed in paragraph 6, affecting SAID PARCEL A and SAID PARCEL B, the right

on part of STATE to relocate the levees within SAID PARCEL A and SAID PARCEL B, either collectively or separately at STATE'S sole cost and expense. Relocation of the levee or levees shall be to the same standards and condition as the then existing levee around SAID PARCEL A and/or SAID PARCEL B; and STATE shall grant to SECOND PARTY an easement for such relocated levee or levees across a substituted 100-foot wide strip on the same terms and conditions as the formerly granted easement for levee maintenance purposes affecting SAID PARCEL A, and SAID PARCEL B. Except for the above, State does not assume and shall have no further liability for such relocated levee or levees. Upon completion of such relocation, the formerly granted maintenance easement affecting SAID PARCEL A and/or SAID PARCEL B shall terminate and be of no force and effect, thereupon a new levee maintenance easement consisting of a 100-foot wide strip southerly of and contiguous to the waterward toe of the relocated levee shall become effective and STATE shall have no liability or duty whatsoever to maintain or repair the existing or relocated levees and may further remove or change such levees at its sole option.

8. SECOND PARTY shall grant, transfer and quitclaim to STATE, by deed as provided in paragraph 17, infra, two perpetual non-exclusive forty (40) foot wide Public Road Easements for the public purposes of public ingress and egress connecting to public roads and in furtherance of recreation, commerce, navigation, and fisheries, to and from the SAID WATERWAY, such easements being appurtenant to such STATE lands within SAID

WATERWAY, and SAID PARCEL A; SAID PARCEL B; SAID PARCEL C; and SAID PARCEL D, and are held and owned by the STATE in its sovereign capacity, on, over, and across those certain lands in the Counties of Napa and Solano, State of California, shown on SAID RECORD OF SURVEY as Public Road Easements A and B. In no event shall Public Road Easements A and B fail to connect SAID PARCEL A and SAID PARCEL D to public roads which SECOND PARTY and STATE agree it is their mutual intent. Said Public Road Easements may only be abandoned by STATE in whole or in part by formal proceedings, any non-user not constituting abandonment.

EXCEPTING AND RESERVING to SECOND PARTY THEREFROM, the right, at its sole expense, to install utilities, pave, install sidewalks, curbs, gutters, storm drains, and landscape the land covered by said easement, so long as it does not unreasonably interfere with public rights of ingress and egress.

SECOND PARTY is further reserved the right to relocate the Public Road Easements. Any such relocation of the Public Road Easements shall be at the sole cost and expense of SECOND PARTY; shall connect to public roads; shall include no unreasonable detours; shall be evidenced by grant deed to STATE; and shall be to the same or better standards and conditions as the relocated road being replaced at the time of such relocation.

9. SECOND PARTY shall ratify, confirm and grant, transfer and quitclaim to STATE, by deed as provided in paragraph 17,

infra, a perpetual easement for the public purposes of recreation, commerce, navigation, and fisheries, and public access to and from and along the SAID WATERWAY, such easement being appurtenant to such STATE lands within SAID WATERWAY, and being held and owned by the STATE in its sovereign capacity, on, over, and across those certain lands in the Counties of Napa and Solano, State of California, such easement being shown on SAID RECORD OF SURVEY as Public Water Access Easement A, the same being limited to non-motorized public uses, except for the use by the STATE of vehicles reasonably required for patrol, inspection, administration, repair and/or maintenance of the easement's condition for public use and like purposes. EXCEPTING AND RESERVING to SECOND PARTY THEREFROM, the right to enter upon Public Water Access Easement A for the purposes of maintenance, repair, alteration, rebuilding, reconstruction, or improvement of the existing levees lying generally southerly of SAID WATERWAY. STATE shall have no liability or responsibility whatever for any damages, injuries, causes of action or otherwise, resulting now or hereafter from any defect in levees within said Public Water Access Easement A, including but not limited to their condition, state of repair or maintenance, design, height, weakness, or any other defect whatsoever; and SECOND PARTY hereby waives any claims, demands, or causes of action against STATE therefor, and agrees to indemnify and hold and save the STATE harmless from any such claims; demands, causes of action of SECOND PARTY, their successors in interest, or any other persons or entities.

EXCEPT, HOWEVER, the foregoing shall not apply and SECOND PARTY shall not be liable for any claims, demands, causes of action, holding harmless, or indemnity, to any persons or entities for damages or injuries resulting from any failure of the STATE to make necessary repairs of damage to the levees of which STATE has actual knowledge of damage caused thereto by STATE'S use of Public Water Access Easement A; or upon STATE'S failure to make such necessary repairs within a reasonable time from written notice by SECOND PARTY to STATE of the need for such repair.

10. So as to permit SECOND PARTY to improve SAID UPLANDS, create internal waterways, or to make similar use of PARCEL E as may be approved by appropriate public agencies; SECOND PARTY shall RESERVE AND EXCEPT from its grant to STATE of Public Water Access Easement A, and Public Water Access Easements B and C hereinafter referred to in the event of the exercise of the option of SECOND PARTY hereinafter referred to in paragraph 15, the right to modify the Public Water Access Easements shown on said RECORD OF SURVEY. Such modifications shall be limited to the form of: (1) a detour route of the Public Water Access Easement southerly from SAID AGREED BOUNDARY LINE with or without the use of a bridge spanning internal waterways; or (2) substitution by means of a bridge over a removed portion of the levee within the location of the Public Water Access Easement shown on SAID RECORD OF SURVEY.
- HOWEVER, any modification is subject to the following conditions:

- a. Any single modification of the Public Water Access Easements, either by detour route with or without the use of a bridge, or substitution in place by means of a bridge, shall in no event modify the Public Water Access Easement for a distance measured along SAID AGREED BOUNDARY LINE which exceeds a total length of 150 feet per modification. Such modification shall not be located immediately adjacent to one another so as to enlarge the total distance per modification in excess of 150 feet.
- b. A contiguous strip along any internal waterway with public access thereto shall be provided if a detoured easement route of the Public Water Access Easements measures 300 feet or more along its path.
- c. The total linear distance for permissible detour of the Public Water Access Easements from their location as shown on SAID RECORD OF SURVEY, or substitution in place by means of a bridge, shall not exceed a cumulative total length of 2,000 feet measured along the detoured paths and/or substituted bridges.
- d. In no event shall modification of the Public Water Access Easements be northerly of SAID AGREED BOUNDARY LINE.

- e. Any modification of the Public Water Access Easements shall be performed in such manner as will continue at all times to retain for STATE a continuous 19-foot wide strip along the entire route of the easements.
  - f. Any modification shall be at the sole cost and expense of SECOND PARTY; shall be evidenced by a grant deed to the STATE; and shall be constructed at least to equivalent standards, utility, and quality as the former unmodified easement.
  - g. Such right of SECOND PARTY to make such modifications shall automatically expire and terminate twenty (20) years from the effective date of this agreement.
  - h. The within conditions are mandatory, and may be modified or amended only with the express written consent of the STATE.
11. In the event of an emergency relating to levee safety for flood control due solely to sudden and avulsive changes, or in the event it is essential to avoid the sudden occurrence of such an emergency, SECOND PARTY may extend temporarily the levees northerly beyond SAID AGREED BOUNDARY LINE into SAID WATERWAY, a distance not to exceed FIVE (5) feet. Such temporary repair shall be restricted solely to the area immediately endangered by said sudden and avulsive conditions creating said emergency. In the event such emergency maintenance or repair measures become necessary and are effectuated, SECOND PARTY shall notify STATE in writing within 30 days

following such action. SECOND PARTY agrees to comply within 30 days after STATE'S written determination, as to whether such fill and/or repair material protruding waterward of SAID AGREED BOUNDARY LINE shall remain, be removed and/or be replaced with a substituted levee system. All costs incidental to STATE determination or in compliance therewith shall be borne by SECOND PARTY, and SECONDPARTY hereby waives any claims, demands, or causes of action against STATE therefor, and agrees to indemnify and hold and save the STATE harmless from any such claims, demands, or causes of action of SECOND PARTY, their successors in interest, or any other persons or entities. Should SECOND PARTY fail to comply with STATE'S written determination within 30 days, STATE may elect to undertake action implementing its determination, and costs resulting therefrom shall be borne by SECOND PARTY.

12. This agreement is also subject to the following:
  - a. An easement affecting the portion of said land and for the purposes stated in the document and incidental purposes, recorded on May 26, 1911, in Book 192 of Deeds, Page 53, Solano County Records, and recorded May 12, 1911, Book 100 of Deeds, Page 286, Napa County Records, in favor of Pacific Gas and Electric Company, a corporation, for a power line 20 feet in width.
  - b. An easement affecting the portion of said land and for the purposes stated in the document and incidental purposes, recorded on October 3, 1951, in Book 594 of Official Records, Page 462, Instrument No. 12426,

Solano County Records, in favor of S. J. Pringle,  
for road purposes, 50 feet in width.

- c. An easement affecting the portion of said land for the purposes stated in the document and incidental purposes, recorded on April 13, 1960, in Book 1023 of Official Records, Page 313, Instrument No. 7234, Solano County Records, in favor of Pacific Gas and Electric Company, for a line of poles and appurtenances, no width given.
  - d. An easement affecting the portion of said land for the purposes stated in the document and incidental purposes, recorded on January 15, 1968, in Book 1488 of Official Records, Page 683, Instrument No. 821, Solano County Records, and recorded December 26, 1967, in Book 779 of Official Records, Page 438, Napa County Records, in favor of Pacific Gas and Electric Company, for electric transmission lines, 120 feet in width.
13. SECOND PARTY agrees to provide STATE with a Boundary Line Agreement guaranty issued by a company satisfactory to STATE insuring STATE in the sum of \$50,000.00; that all necessary parties to this agreement are in fact parties thereto, and a California Land Title Association Standard Coverage Policy of Title Insurance insuring the STATE'S title to the SAID PARCEL A, SAID PARCEL B, SAID PARCEL C, and SAID PARCEL D, Public Water Access Easement A, and Public Road Easements A and B, in the sum of \$150,000.00, without cost to STATE.

14. In approving this agreement, the State Lands Commission, pursuant to Public Resources Code section 6307, shall find and adopt a resolution that the lands described in Exhibit B of this agreement have been improved, filled and reclaimed by SECOND PARTY or their predecessors in interest and have thereby been excluded from the public channels and are no longer available or useful or susceptible for navigation and fishing, and are no longer in fact tidelands or submerged lands, and therefore are free from the public trust for commerce, navigation and fishing.
15. There is reserved to SECOND PARTY the option for a period of two (2) years from the effective date of this agreement to substitute for SAID PARCEL B and SAID PARCEL C, certain lands in the County of Napa (commonly known as Coon Island), particularly described as Swamp and Overflowed Land Patent Survey 126 and as described in the Patent to George Rutledge, recorded June 12, 1875, in Book B of Patents at Page 86 in the Office of the County Recorder of Napa County, together with any accretions or other additions thereto, with such option to be exercised by SECOND PARTY by delivery to STATE of a good and sufficient and duly acknowledged grant deed to STATE.

Any and all unpaid taxes on Coon Island as of the date of closing shall be discharged by SECOND PARTY. At its sole cost and expense SECOND PARTY shall provide STATE with a Standard California Land Title Association Policy of Title Insurance insuring STATE'S title in the sum of \$150,000.00 containing only the following exceptions:

1. Taxes or assessments which are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the public records.
2. Any facts, rights, interests, or claims which are not shown by the public records but which could be ascertained by an inspection of said land or by making inquiry of persons in possession thereof.
3. Easements, claims of easement or encumbrances which are not shown by the public records.
4. Discrepancies, conflicts in boundary lines, shortage in area, encroachments, or any other facts which a correct survey would disclose, and which are not shown by the public records.
5. Unpatented mining claims, reservations or exceptions in patents or in Acts authorizing the issuance thereof; water rights, claims or title to water.

SECOND PARTY shall also convey to STATE its good, proper, and acknowledged grant of easement on, over, and across the lands described on SAID RECORD OF SURVEY as Public Water Access Easements B and C for the purposes and on the same terms and conditions as the grant of easement to State of Public Water Access Easement A, hereinabove referred to, together with a grant of easement of the portion of Public Road Easement A crossing SAID PARCEL B. Upon delivery of such grant deeds to STATE, the lands hereinabove described as SAID PARCEL B and SAID PARCEL C shall revert to SECOND PARTY, subject to

reservation by STATE of said Public Water Access Easements B and C and the portion of Public Road Easement A crossing SAID PARCEL B, and STATE agrees to deliver its duly acknowledged quitclaim deed of SAID PARCELS B and C to SECOND PARTY, excepting and reserving easements. The option shall automatically terminate and expire if not exercised within two (2) years of the effective date of this agreement.

16. An escrow account will be opened by the parties to this agreement for the depositing, processing and recording of all documents to effectuate this agreement. The parties to this agreement may provide the escrow officer with such further instructions and documents as are necessary for the accomplishment of this agreement. The escrow officer is empowered to date all instruments and documents by inserting in the date blanks the date of recordation. All costs of the escrow account shall be paid by SECOND PARTY.
17. EFFECTIVE DATE. This agreement shall become effective upon the occurrence of all of the following items:
  - a. Execution of this agreement by STATE and SECOND PARTY;
  - b. Execution of documents substantially in the form set forth as:
    - i. Deeds for conveyance of property described in paragraphs 4, 6, 8, and 9;
    - ii. Exhibit B.
  - c. When all documents referred to in a and b of this paragraph have been executed, the recording of the

documents in the Office of the County Recorder of Napa and Solano Counties in the following specific order shall be made:

- i. This agreement;
  - ii. SAID RECORD OF SURVEY, in the form of Exhibit A;
  - iii. Exhibit B;
  - iv. Deeds described in this paragraph (b)(i) above.
- d. Recording of the documents referred to in subparagraph c above shall conclusively establish that all requirements of paragraph 16 have been fulfilled.
18. As to the property being conveyed to STATE by this agreement any and all unpaid taxes on said property as of the date of closing shall be discharged by SECOND PARTY.
19. As used in this agreement the term "levee maintenance" is to include the ordinary maintenance, repair, alteration, rebuilding, reconstruction, or improvement of the presently existing or future levees lying generally southerly of SAID WATERWAY. SECOND PARTY has the right to enter SAID PARCEL A, SAID PARCEL B, SAID PARCEL C, SAID PARCEL D, and the Public Water Access Easements subject to the areas or other limitations enumerated heretofore. In order to allow SECOND PARTY to provide for the necessary repair and maintenance of the levees now or for hereafter so as to protect SAID UPLANDS from the overflow of waters, STATE agrees that such

maintenance activities as may reasonably be required shall be permitted so long as such activities do not unduly or unreasonably interfere with STATE'S use and enjoyment of its parcels or easements; are performed in a prompt and diligent manner, and do not extend the levees northerly beyond SAID AGREED BOUNDARY LINE. SECOND PARTY is similarly reserved the right to take in and pump out waters between the levees and exercise other such rights of a riparian nature subject to a permit, if required, from any appropriate governmental agency. However, STATE shall have no liability or responsibility whatever for damages, injuries, causes of action or otherwise, resulting now or hereafter from any maintenance activities performed by SECOND PARTY pursuant to this agreement and SECOND PARTY hereby waives any claims, demands or causes of action against STATE therefor and agrees to indemnify and hold the STATE harmless from any such claims, demands, or causes of action of SECOND PARTY, their successors in interest, or any other persons or entities.

20. Any responsibility for fencing shall remain that of SECOND PARTY at its sole cost and expense.
21. All provisions of this agreement, including but not limited to those provisions providing for the fixing of SAID AGREED BOUNDARY LINE, the exchange of deeds between the parties for certain parcels of land, the creation of easements in both parties in the lands of the other, the reservations and exceptions pertaining to said parcels and easements, and the according of rights of any nature to either party in the lands of the other, are in mutual consideration of every other

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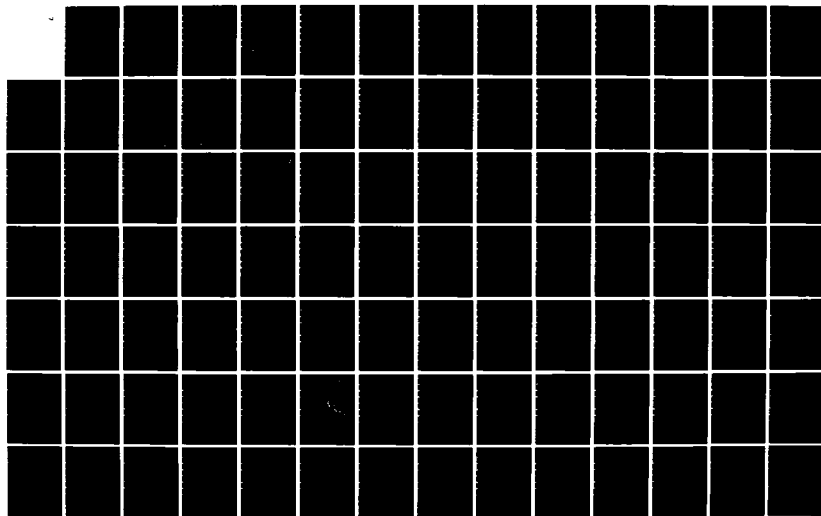
FINAL ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT  
STATEMENT CULLINAN. (U) CORPS OF ENGINEERS SAN  
FRANCISCO CA SAN FRANCISCO DISTRICT MAY 84

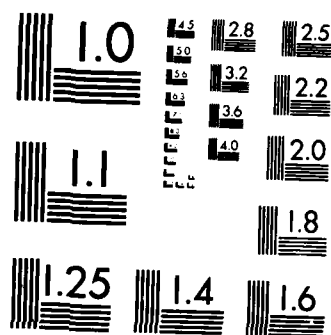
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provision of this agreement, and are entered into pursuant to authority contained in Sections 6307 and 6357 of the Public Resources Code. Notwithstanding the foregoing provisions of this paragraph, STATE and SECOND PARTY agree that upon and after the close of escrow, each provision of this settlement agreement is intended to be severable, and shall continue in full force and effect although other provisions herein may be determined invalid or void for any reason.

22. It is expressly understood by the parties hereto that the provisions set forth herein have been agreed upon for purposes of compromising and settling the respective disputed interests and boundary line of the parties hereto. This agreement shall not constitute any expression on the part of the STATE as to the extent or location of any other interest or boundary of the lands of the STATE OF CALIFORNIA except as may be expressly provided for herein.
23. The terms, provisions, and conditions hereof shall be binding upon and inure to the benefit of the respective heirs, administrators, executors, successors, and assigns of the parties hereto. The burden of indemnity wherever referred to in the agreement shall be deemed to be a covenant running with the land and shall not thereby constitute any obligation greater than provided by Civil Code section 1466.

IN WITNESS WHEREOF, each party hereto has caused this agreement to be executed.

Mildred Cullinan  
Mildred Cullinan  
Maurice Cullinan

STATE OF CALIFORNIA  
 STATE LANDS COMMISSION

By:

E. N. Gladish  
 E. N. GLADISH  
 Executive Officer  
 State Lands Commission

ROYAL LAND CORPORATION  
 By William D. Younger  
 William D. Younger, President  
Attest  
William D. Younger  
 William D. Younger, Secretary

Approved as to form:

EVELLE J. YOUNGER  
 Attorney General

By:

Bennis M. Eagan  
 BENNIS M. EAGAN  
 Deputy Attorney General

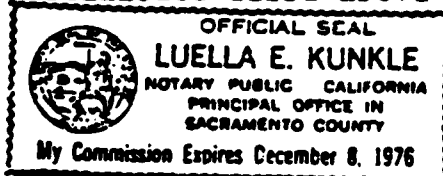
STATE OF CALIFORNIA )  
 ) ss.  
 COUNTY OF SACRAMENTO )

On April 12, 1974, before me, the undersigned, a Notary Public in and for said State, with principal office in Sacramento County personally appeared E. N. GLADISH, known to me to be the Executive Officer of the State Lands Commission, State of California, the Commission that executed the within Instrument, known to me to be the person who executed the within Instrument on behalf of the Commission therein named, and acknowledged to me that such Commission executed the within Instrument pursuant to a resolution of the Commissioners unanimously adopted on February 28, 1974, at a regular meeting thereof.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal on the day and year in this certificate first above written

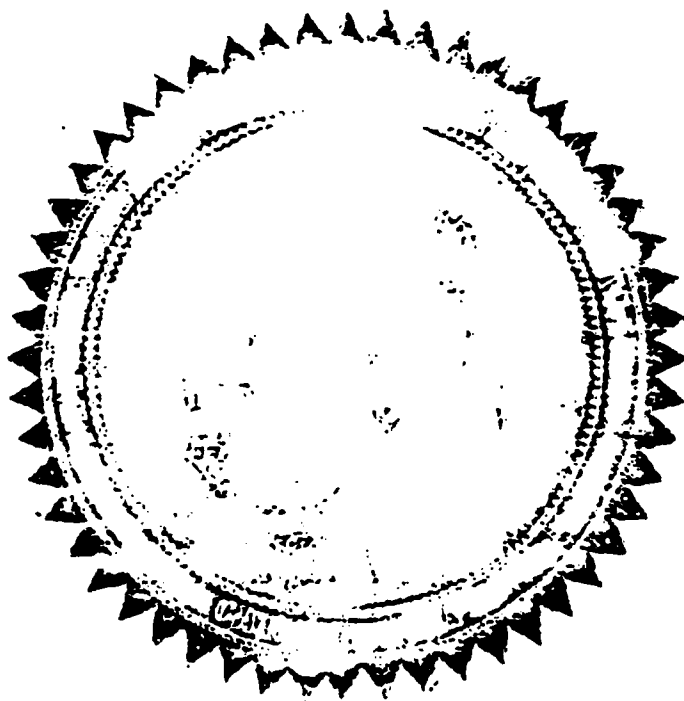
Luella E. Kunkle  
 Notary Public in and for  
 the County of Sacramento,  
 State of California

(Seal)



IN APPROVAL WHEREOF, I, RONALD REAGAN, Governor of the State of California, have set my hand and caused the Seal of the State of California to be hereunto affixed pursuant to Section 6107 of the Public Resources Code of the State of California. Given under my hand at the City of Sacramento, this, the 17<sup>th</sup> day of April, in the year of our Lord one thousand nine hundred and seventy four.

Ronald Reagan  
GOVERNOR  
STATE OF CALIFORNIA



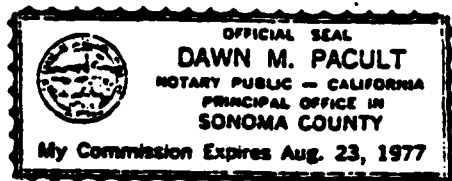
Attest:

Edmund G. Brown  
SECRETARY OF STATE  
- by Miguel R. Hernandez  
Deputy Secretary of State

STATE OF CALIFORNIA )  
 ) ss.  
COUNTY OF SONOMA )

On February 13, 1974, before me, the undersigned, a Notary Public in and for said State, personally appeared MAURICE CULLINAN, MILDRED CULLINAN, and G. JACQUELINE CULLINAN, known to me to be the persons whose names are subscribed to the within instrument and acknowledged to me that they executed the same.

WITNESS my hand and official seal.

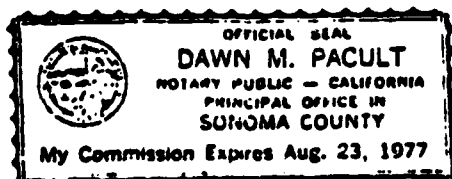


Dawn M. Pacult  
Notary Public in and for said State

STATE OF CALIFORNIA )  
 ) ss.  
COUNTY OF SONOMA )

On February 13, 1974, before me, the undersigned, a Notary Public in and for said State, personally appeared G. JACQUELINE CULLINAN, known to me to be trustee of the Trust created by the Will of Martin Cullinan, deceased, and the person whose name is subscribed to the within instrument and acknowledged to me that that trust executed the same.

WITNESS my hand and official seal.



Dawn M. Pacult  
Notary Public in and for said State

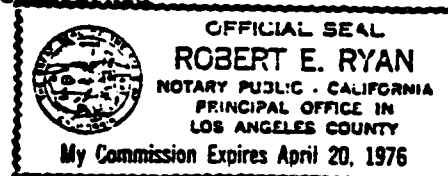
STATE OF CALIFORNIA )  
 ) ss.  
 COUNTY OF LOS ANGELES)

On *February 11, 1974* before me, the undersigned, a Notary Public in and for said State, with principal office in Los Angeles County personally appeared WILLIAM D. RYAN, known to me to be the President, and Y. L. ROSS, known to me to be the Secretary of ROYAL LAND CORPORATION, the corporation that executed the within Instrument, known to me to be the persons who executed the within Instrument on behalf of the corporation therein named, and acknowledged to me that such corporation executed the within Instrument pursuant to its bylaws and a resolution of its board of directors unanimously adopted on *February 11, 1974* at a special meeting thereof.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal on the day and year in this certificate first above written.

*Robert E. Ryan*

Notary Public in and for the County of Los Angeles, State of California



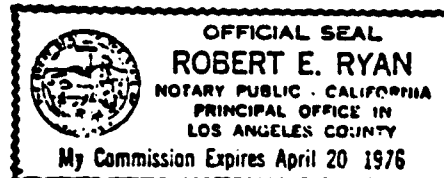
STATE OF CALIFORNIA )  
 ) ss.  
 COUNTY OF LOS ANGELES)

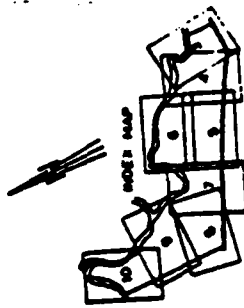
On *February 11, 1974* before me, the undersigned, a Notary Public in and for said State, personally appeared WILLIAM DESMOND RYAN, known to me to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal on the day and year in this certificate first above written.

*Robert E. Ryan*

Notary Public in and for the County of Los Angeles, State of California





NOTICE: This survey was made in accordance with the provisions of the Survey Law of the State of California, Chapter 10, Section 100, et seq., and the provisions of the Survey Law of the State of California, Chapter 10, Section 100, et seq., and the provisions of the Survey Law of the State of California, Chapter 10, Section 100, et seq.

**SURVEYOR'S CERTIFICATE**

I, the undersigned, being a duly qualified Surveyor of the State of California, do hereby certify that the foregoing is a true and correct copy of the original survey as shown to me by the owner thereof.

*W. H. HARRIS*  
Surveyor

THE COUNTY SUPERVISORS of the County of Solano, California, do hereby certify that the foregoing is a true and correct copy of the original survey as shown to me by the owner thereof.

*James H. Haggard, County Surveyor*  
Solano County, California

**COUNTY RECORDER'S CERTIFICATE**

I, the undersigned, being a duly qualified County Recorder of the County of Solano, California, do hereby certify that the foregoing is a true and correct copy of the original survey as shown to me by the owner thereof.

*James E. Haggard, County Recorder*  
Solano County, California

**RECORD OF SURVEY**

**CULLINAN RANCH**  
SECTIONS 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 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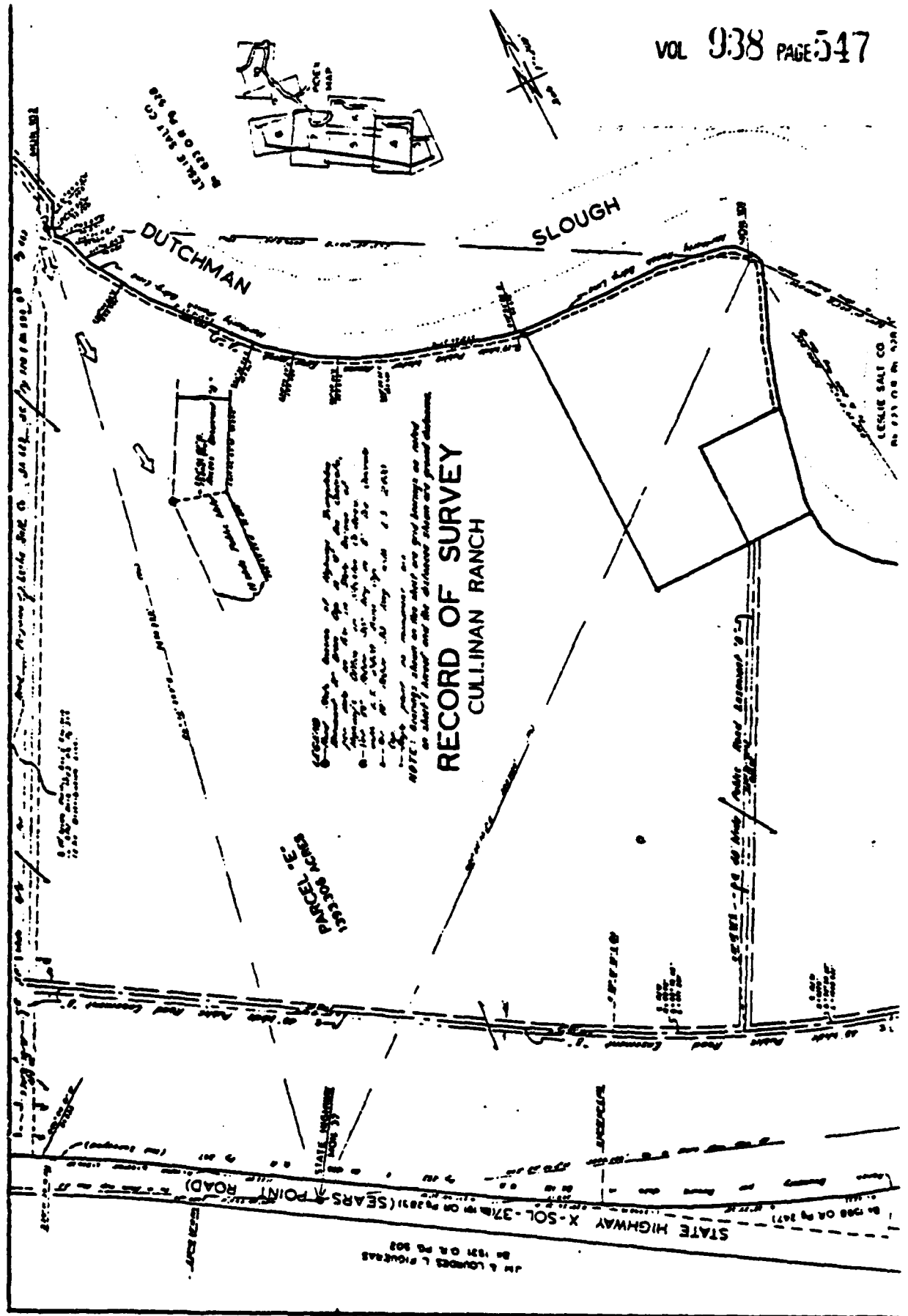
COLEMAN KANGI  
SECTIONS 45, 46, 47 & 48, 13N, 14W M0B & M  
SECTIONS 20, 21, 22, 14N, 15W M200 & M

**JR Licensed Land Surveyor**

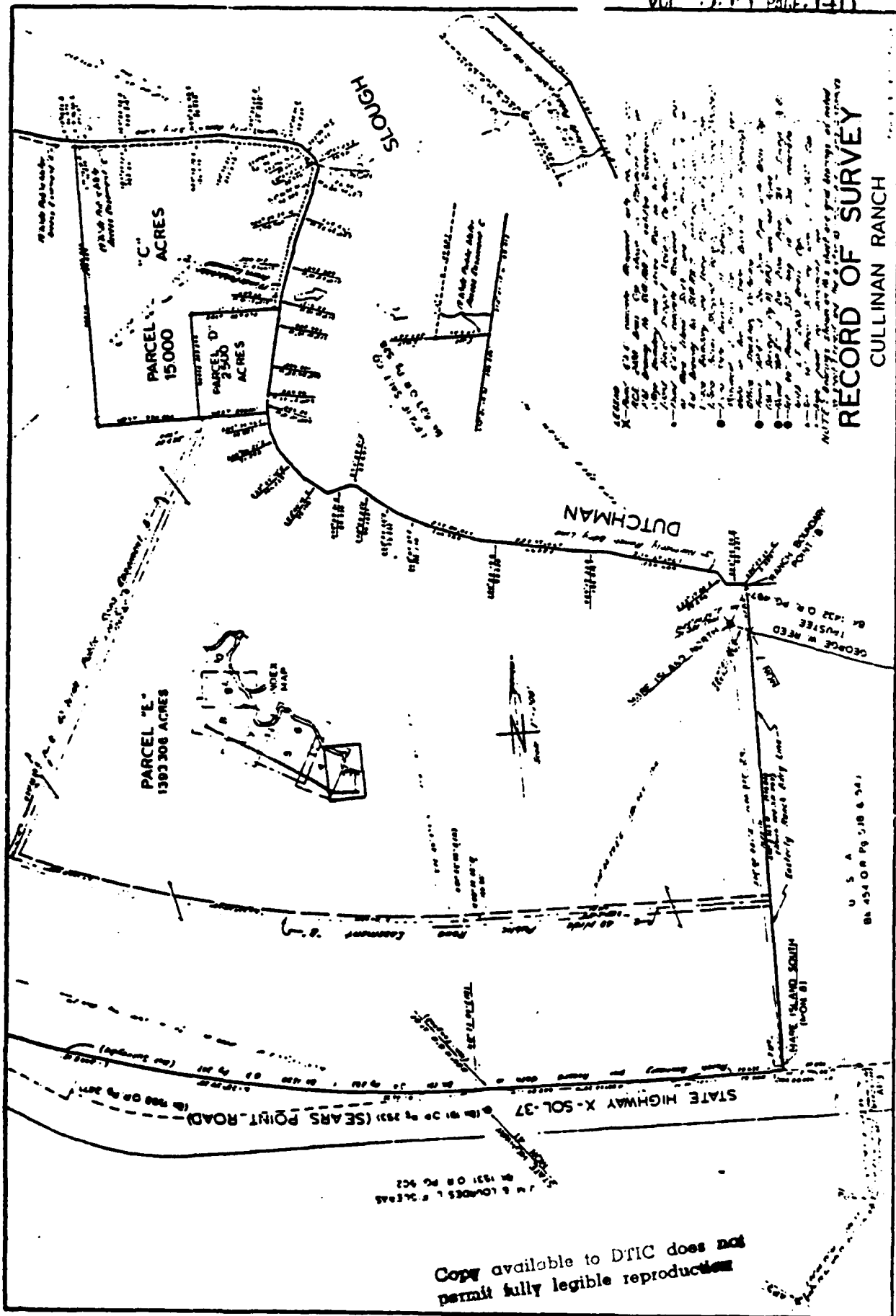
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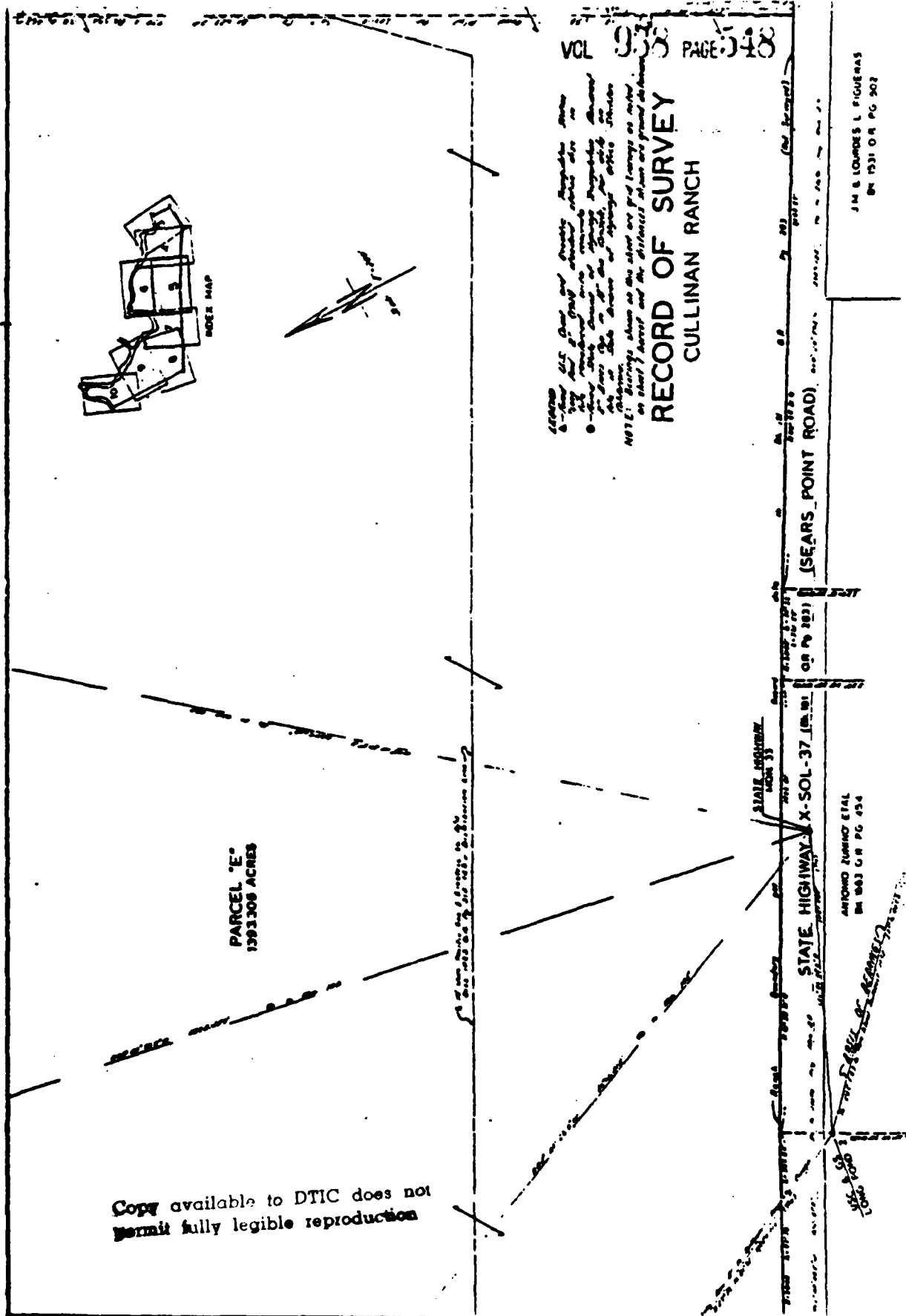
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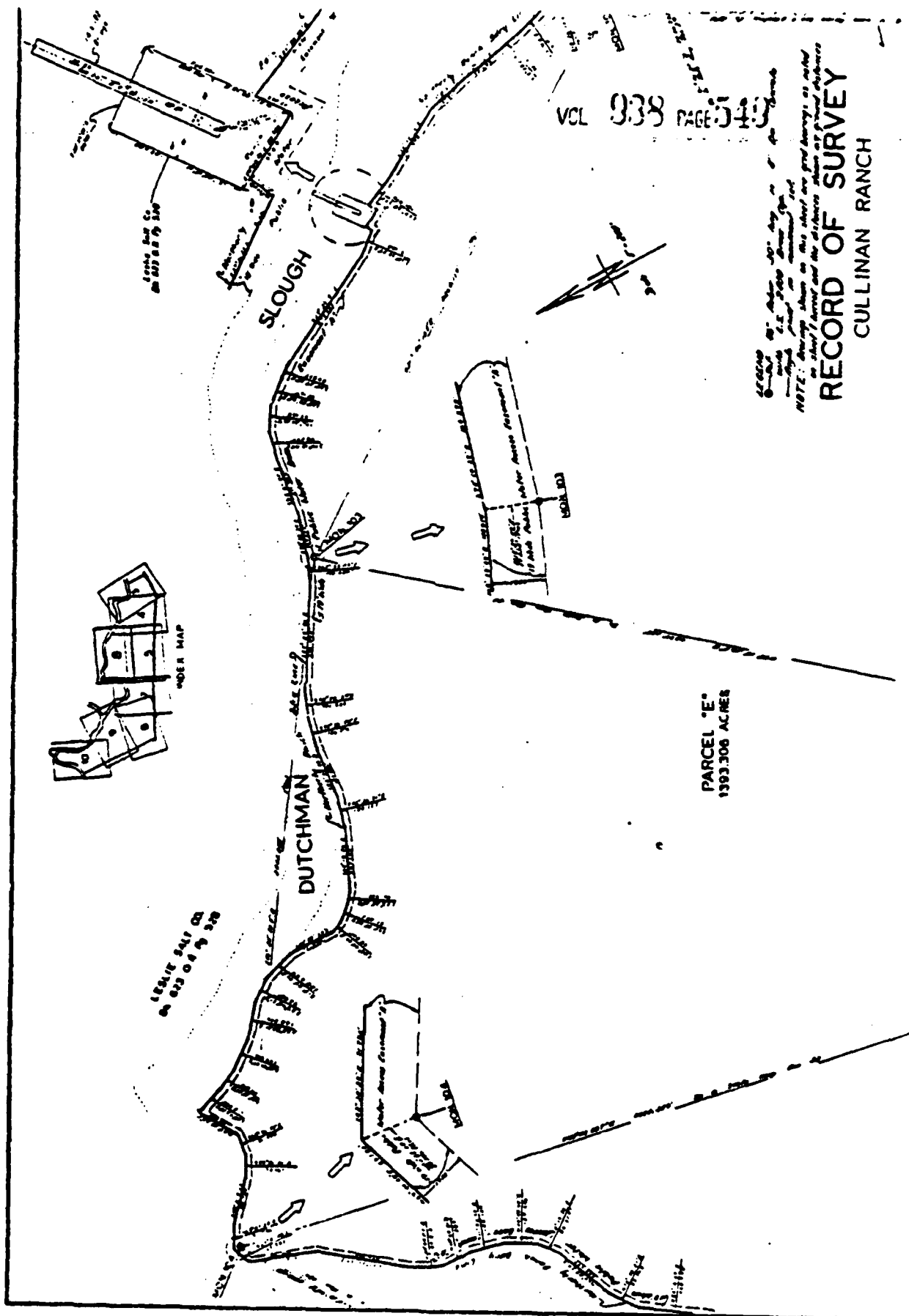




VCL 938 PAGE 548

JIM & LOUISE L. FIGUEROA  
BN 1531 OR PG 502

ARONDO TURNER ET AL  
BN 843 OR PG 454







6-25-40 30' above top of the drive  
and  
15' above base of the drive  
NOTE: Average diam. in this hole is 3" and average is 2 1/2"  
about 1/2" and the diameter above are found at 10'

LESLIE SALT CO  
Box 623 OR 97 324

**SOUTH**

PARCEL "E"  
1393.306 ACRES

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מס' ת"פ 17537  
ת"פ 17537



CULLINAN RANCH  
BOUNDARY AND EXCHANGE AGREEMENT  
B.L.A. 142

Recorded at the request of:  
State of California  
State Lands Commission

WHEN RECORDED mail to:

STATE OF CALIFORNIA  
OFFICIAL BUSINESS - Document  
entitled to free recordation  
pursuant to Government Code  
Section 6103

NO TAX DUE \_\_\_\_\_

\_\_\_\_\_  
Above space for Recorder's use

PATENT CERTIFICATE NO.

STATE OF CALIFORNIA

TO ALL TO WHOM THESE PRESENTS SHALL COME, GREETINGS:

WHEREAS, on \_\_\_\_\_, 1974 under authority of Sections 6107, 6301, and 6307 of the Public Resources Code, the STATE LANDS COMMISSION authorized the settlement of the title and boundary dispute between the STATE OF CALIFORNIA (hereinafter referred to as "STATE") and MAURICE CULLINAN and MILDRED CULLINAN, his wife; G. ACQUILINE CULLINAN, also known as G. JACQUELINE CULLINAN, as her separate person and G. JACQUELINE CULLINAN, as Trustee of the Trust created by the Will of \_\_\_\_\_ Cullinan, Deceased (Sonoma County Probate Case No. 32337), as their interest appears of record; ROYAL LAND CORPORATION, a California corporation, and WILLIAM DESMOND RYAN, individually; hereinafter collectively referred to as SECOND PARTY without regard to number or gender; with respect

to certain lands in Napa and Solano Counties, California, to be effected in part by a confirmation by the parties of title as to certain lands and by an exchange of lands between the STATE and SAID SECOND PARTY, the terms and conditions of which settlement are fully set forth in that certain agreement entitled: "CULLINAN RANCH BOUNDARY AND EXCHANGE AGREEMENT" (B.L.A. \_\_\_\_\_), dated \_\_\_\_\_, 1974, and recorded in Book \_\_\_\_\_, page \_\_\_\_\_ et seq. of the Official Records of Napa County, California, and recorded in Book \_\_\_\_\_, page \_\_\_\_\_ et seq. of the Official Records of Solano County, California.

WHEREAS, it appears by the Certificate of the Executive Officer of the State Lands Commission issued in accordance with the provisions of law that:

- (a) full consideration through medium of exchange has been received by the STATE for the confirmation, conveyance and transfer of lands, interests, and rights provided herein in the form of the covenants, agreements, and obligations of the transferees and others set forth in the Settlement Agreement and the agreements entered into and documents delivered pursuant thereto;
- (b) the value of the lands exchanged, transferred and conveyed by the Deed executed by SAID SECOND PARTY, in favor of the STATE in exchange for the lands exchanged, conveyed, and transferred by STATE by this patent are equal to or greater in value than the lands conveyed, transferred and exchanged by this patent and;
- (c) the patentees designated in this patent are entitled to receive this patent;

## APPENDIX G

Charts dealing with Diked Bayland Habitats, proposed land uses and local protection ordinances, prepared by the Bay Institute of San Francisco, December 27, 1982

The following tables were prepared by the Bay Institute of San Francisco. These tables are intended to show the vulnerability of diked baylands to urban development throughout much of the Bay Area.

Table I shows the acreage of wetland habitat by category throughout the Bay Area.

Table II shows the designated land uses of wetland acreage based on County general plans.

Table III shows the relative effort of protection of diked baylands based on the zoning ordinances of local governments throughout the Bay Area.

TABLE I

Habitat Classification  
(Acres)

<u>County</u>	<u>Salt Marsh</u>	<u>Brackish Marsh</u>	<u>Pond Lagoon</u>	<u>Freshwater Marsh</u>	<u>Cultivated/Upland</u>	<u>Mixed Habitat</u>	<u>County Total</u>
ALAMEDA	2,049	-	2,427	463	1,060	-	5,999
CONTRA COSTA	444	423	937	103	827	62	2,796
MARIN	945	627	336	29	5,579	552	8,068
NAPA	-	169	554	-	2,107	952	3,782
SAN MATEO	220	25	2,143	-	450	91	2,929
SANTA CLARA	1,882	167	814	-	80	193	3,136
SOLANO	320	33	731	-	1,600	-	2,684
SONOMA	299	-	286	-	20,895	282	21,762
Total	6,159	1,444	8,228	595	32,598	2,132	51,156
Percent Total	12%	3%	16%	1%	64%	4%	100%

TABLE II

Proposed Land Use\*  
(Acres)

<u>County</u>	<u>Agriculture</u>	<u>Urban Development</u>	<u>Open Space/Park</u>	<u>County Total</u>
ALAMEDA	147	2,666	3,186	5,999
CONTRA COSTA	0	2,589	207	2,796
MARIN	2,709	3,924	1,435	8,068
NAPA	3,176	606	0	3,782
SAN MATEO	0	2,848	81	2,929
SANTA CLARA	0	942	2,194	3,136
SOLANO	1,663	975	46	2,684
SONOMA	21,013	386	363	21,762
Total	28,708	14,936	7,512	51,156
Percent Total	56%	29%	15%	100%

\*Information from recent County General Plans

TABLE III\*

<u>Jurisdiction<sup>+</sup></u>	<u>Number of Sites</u>	<u>Total Acreage</u>
<u>Class A -- Fair-to-good local protection of diked baylands available</u>		
Hayward	18	2672
Marin County	35	5514
Corte Madera	2	42
Menlo Park	9	218
Santa Clara County	3	326
Solano County	2	1653
<u>Class B -- Some local protection of diked baylands available</u>		
Fremont	5	1037
Union City	1	147
Pinole	1	20
Novato	14	2053
Napa County	23	3077
San Mateo	4	86
Sunnyvale	5	571
Sonoma County	56	21,266
<u>Class C -- Little or no protection of diked baylands at local level</u>		
Alameda County	1	228
Alameda	2	71
Newark	5	650
Oakland (Port)	5	826
San Leandro	3	278
Martinez	1	41
Contra Costa County	29	2196
Richmond	6	539
Larkspur	1	3
Mill Valley	1	5
San Rafael	7	451
Napa	4	705
Foster City	5	58
So. San Francisco	1	51
Redwood City	14	2487
Palo Alto	2	1236
San Jose	7	939
Vallejo	8	1031
Petaluma	3	496

\*This table does not include all public agencies owning diked historic baylands, e.g. City of Berkeley (Aquatic Park), City of Mountain View, sewage districts, mosquito abatement districts, and flood control districts. All acreages are approximate only.

<sup>+</sup>Listed per alphabetical order by county: Alameda, Contra Costa, Marin, Napa, San Mateo, Santa Clara, Solano, Sonoma. San Francisco is omitted because it contains no unfilled diked historic tidelands.

Bay Institute of San Francisco 12/27/82

## APPENDIX H

Letter from California Archaeological Inventory, Northwest Information Center,  
Sonoma State University to Torrey & Torrey, January 17, 1983

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**TORREY & TORREY INC.**  
environmental / urban planning and design

August 5, 1983

Mr. Mike Rondeau  
Office of Historic Preservation  
Department of Parks and Recreation  
P.O. Box 2390  
Sacramento, California 95811

Re: Cullinan Ranch DEIR/EIS

Dear Mr. Rondeau:

At your request, we are enclosing a copy of archeological literature search for the DEIR/EIS. Based on our conversation last week, we understand that this will be sufficient for clearance from your office.

Thank you for your cooperation .

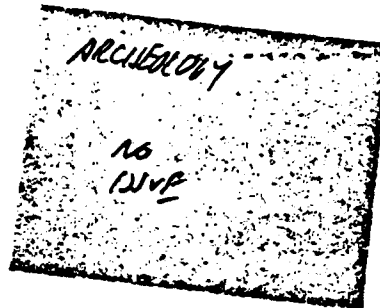
Sincerely yours,

*I. P. Torrey*

Irina Perlis (I.P.) Torrey, AICP  
President

cc: Ann Merideth, Assistant Planning Director, City of Vallejo

Enclosure



California  
Archaeological  
Inventory



ALAMEDA  
CONTRA COSTA  
DEL NORTE  
HUMBOLDT

LAKE  
MARIN  
MENDOCINO  
NAPA  
SONOMA

Northwest Information Center  
Department of Anthropology  
Sonoma State University  
Rohnert Park, California 94928  
(707) 664-2494.

17 January 1983

File No.: 6080-1515-J

Gerald Edelbrock  
Torry & Torrey, Inc.  
One Sutter Street, Suite 707  
San Francisco, CA 94104

re: Archaeological records search for Cullinan Ranch near Mare Island,  
Solano County

Dear Mr. Edelbrock:

I write in response to your request received 12 January 1983 for an archaeological records search of the parcel depicted on the map that accompanied your letter. The records search consisted of an examination of the sources referred to or listed in the "Literature Reviewed" section of this letter.

During the course of this records search, it was noted that there were no previously recorded archaeological sites within the subject parcel. It was noted also that no part of the subject property had been systematically field checked by a qualified archaeologist for the presence of archaeological resources. Therefore, we cannot necessarily conclude that sites do not exist in the area. Ethnographic information and the locations of nearby archaeological sites do suggest, however, that archaeological sites tended to be situated on higher land than that contained within the Cullinan Ranch. Consequently, the parcel is considered to be of low archaeological sensitivity. No further archaeological study is therefore recommended at this time. In the event that archaeological deposits are encountered during construction, work should be shifted to another area, and a qualified archaeologist contacted to evaluate the finds and offer appropriate recommendations.

Please sign and return the enclosed confidentiality form. If you have any question, or if we can be of further assistance, call or write to me. Thank you for using our services.

Sincerely,

  
Allan G. Bramlette  
Assistant Coordinator

AGB/lm

RECEIVED JAN 20 1983

### Literature Reviewed

In addition to pertinent archaeological maps and site records on file at the Northwest Information Center, Sonoma State University, following is a list of archaeological, ethnographic and historical literature reviewed. Archaeological impact reports (AIR's) reviewed for this records search are noted in the enclosed Agreement of Confidentiality by their file numbers.

#### Department of Parks and Recreation

1976 California Inventory of Historic Resources. Sacramento: State of California.

1979 California Historical Landmarks. Sacramento: State of California.

#### Fredrickson, David A.

1977 A Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas, Historical and Archaeological Resources Vol. III, Chapter 7. Prepared by Winzler and Kelly Consulting Engineers for Bureau of Land Management.

#### Johnson, Patti J.

1978 Patwin. In Handbook of North American Indians, Volume 8, California. Robert F. Heizer, ed. Washington, D.C.: Smithsonian Institution.

#### Kroeber, A. L.

1925 Handbook of the Indians of California. Bureau of American Ethnology of the Smithsonian Institution, Bulletin 78. Washington, D.C.: Government Printing Office.

#### U.S. Office of the Federal Register

1979 Federal Register, Notices, National Register of Historic Places, Annual and Cumulative Listing. Washington D.C.: U.S. Government Printing Office, 44(25):7428-7436.

1980 Federal Register, Notices, National Register of Historic Places, Annual Listing. Washington D.C.: U.S. Government Printing Office, 45(4):17448-17449.

1981 Federal Register, Notices, National Register of Historic Places, Annual Listing. Washington D.C.: U.S. Government Printing Office, 46(22):10624-10625.

**APPENDIX I**

**Dredging of Cullinan Ranch Lagoons and Channels Memorandum from Krisida W. Jones, Deputy City Attorney, Vallejo to David L. Lindquist, Assistant City Manager, June 1, 1983**

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OFFICE OF THE CITY ATTORNEY  
CITY OF VALLEJO  
CITY HALL  
VALLEJO, CALIFORNIA 94590

June 1, 1983

SUBJECT: Dredging of Cullinan Ranch Lagoons and Channels

TO: David J. Lindquist, Assistant City Manager

You asked whether the Landscape and Lighting Act of 1972 provides the general framework for fiscal planning of an anticipated Cullinan Ranch service. The proposed Cullinan Ranch project will incorporate lagoons and channels which will be affected by bay tidal action. Over a period of several years, the lagoons and channels will become filled with silt and will require dredging. Dredging will place a substantial financial burden on the city unless other means can be found for payment of the dredging operation. There are several methods for handling the anticipated costs.

I

Landscape and Lighting Act of 1972

The Act has been codified in Streets and Highways Code, §§22400 - 22679. The Act permits the formation of a district for the general purpose of providing landscaping and lighting within the district. Under the Act assessments may be made for works of improvement within the district. Improvement includes planting landscaping and construction of facilities which are connected with landscaping. Under a broad reading of the Act, if dredging the channels would assist in the maintenance of the landscaping, funds could be collected and held for periodic dredging.

The Act provides the mechanism for formation of the district and which may be accomplished by City council. The only problem with using the Act is that it requires some stretching of the literal language to accomplish dredging. If use of the Act for dredging is challenged, it would be difficult to withstand the challenge since by its title it appears to envision landscaping and lighting as defined. It would be difficult to show that maintenance dredging is ancillary to landscaping.

II

Reclamation Act.

The Water Code §50000 to 53901 provides the general framework for formation of a reclamation district. A reclamation

district is one which maintains irrigation of large tracts of land. Maintenance includes creation of levees and channels as well as control of surface waters. Although such districts are generally county wide, §50110 and 50111 permit formation within cities with duties usually performed by county officers to be performed by city officers.

A Reclamation District may be formed by petition to the County Board of Supervisors. Under §50111 the City Council would probably be substituted for the board. The petition is presented by owners of 1/2 of affected tide lands or other lands subject to flood or overflow. Where the petition is approved, it is thereafter recorded with the county recorder. The district is run by a board of trustees who are elected by landowners of the district. The property within the district is assessed for the costs of the election.

Generally, reclamation districts are formed to accomplish large agricultural tasks and the law is written to accomplish this purpose. However, the developments at Discovery Bay and Bethel Island in Contra Costa County are covered by local reclamation districts which provide for flooding, levees and periodic dredging. In addition, reclamation districts may provide for waste disposal and maintain sewage treatment facilities. Water Code, §50905.

The land of the district is assessed for the services performed. In addition, §50902 permits the district to charge fees for services. The attractive feature of the reclamation district act is that it very directly addresses the concerns about maintenance dredging of the Cullinan Ranch and it may be created fairly easily. Since it is neither an ad valorem tax nor a revenue raising measure, it is not affected by Article XIII §19A of the California constitution, the Tax Initiative.

### III

#### Special Assessment District

As a charter city, Vallejo may create any special district its Council deems to be necessary without reference to any particular state law provision. In order to overcome the barriers imposed by Article XIII §19A, it is necessary that the ordinance recite the benefits attaching to the affected property. In addition, the boundaries of the district must be clearly defined. So long as the assessments do not exceed the costs of the benefit, the special assessment district will not require voter approval. Solvang Municipal Corp. Dist. vs. Bd. of Supervisors 112 Cal.App.3d 545.

The dredging of the Cullinan Ranch development may be the

subject of an assessment district covering only the property within the development. The revenue raised must be limited to the costs of dredging otherwise the assessment may be deemed to be a revenue raising tax and therefore is a means for circumventing Article XIII §19A. Where the revenue raised does not exceed the cost of the service, no election would be necessary to implement the assessment.

In 65 Attorney General Opinions 176, a county raised funds for snow removal from assessment of land fronting the road despite the fact that snow removal benefited the county as a whole. Since the revenue raised did not exceed the cost of snow removal, the Attorney General felt it was a compensatory fee or special assessment which did not require voter approval. Opinion No. 81-011- 3/3/82.

Under its general charter, the City may raise revenue including special assessments earmarked to compensate for specific services. Property within a discrete area within the City may be assessed the cost for the service to the extent that such property is benefited. The assessment district thus created does not require voter approval.

#### IV

#### CC&R's

Another mechanism for financing of dredging may be placed in the CC&R's for the Cullinan Ranch development. If a homeowner's association is formed, it may act to collect and impound fees to be raised for periodic dredging. Most people I contacted felt that this mechanism is a weak alternative to special assessments or reclamation district formation because CC&R's do not carry the legal authority of the statutory provisions.

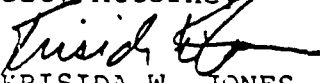
If the CC&R mechanism is used, it is necessary to begin negotiation between the planning department and the developer for inclusion of the requirement. Inclusion would be a condition of approval of development plans.

Even if CC&R's will not be used to create the financing method for dredging, it might be advisable to place the dredging requirement in the CC&R. In that way, later owners would have notice that an assessment district exists and that it has a valid purpose. This could reduce later attacks on the assessment as a violation of the Taxing Initiative.

I hope this adequately addresses the concerns you raised. If you have any questions, please call me.

Very truly yours,

JOHN M. POWERS  
City Attorney

  
KRISIDA W. JONES  
Deputy City Attorney

**APPENDIX J**

**Geotechnical Appendix, Harding Lawson Associates, August 18, 1983**

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Harding Lawson Associates



Transmittal/Memorandum

To: W. R. Williams, Inc.  
2130 Main Street, Suite 230  
Huntington Beach, California 92648

Attention: Mr. Waldon Williams/Mr. Carl Neuhauser

From: Dennis H. Furby  
Date: August 18, 1983  
Subject: Cullinan Ranch Soil Investigation - Phase A  
Job No.: PW 83-1815.01

**Remarks:**

This memo informally outlines our approach, scope of services, and fee estimates for our investigation of Phase A of the Cullinan Ranch project. Following review and approval, we will formalize these in a letter and Service Agreement.

**Assumptions**

1. Area to be investigated is an enlarged Phase A (one peninsula beyond Phase A currently indicated in the Master Plan); this includes the turning basin, small boat harbor, and the first three residential peninsulas.
2. The level of field exploration and laboratory testing will be sufficient to provide the required design recommendations, evaluate subsequent alternatives, and to respond to questions and conditions resulting from the EIR Draft Review. However, some of the actual engineering may be deferred until it is actually needed.
3. Geotechnical engineering items requiring exploration and evaluation are as follows:
  - Thickness of normally consolidated mud and variations in total mud thickness to confirm previous settlement estimates
  - Variations in thickness and consolidation characteristics of peat to confirm differential settlement estimates

cc: Lee Oberkamper  
Paul Moote

Engineers  
Geologists &  
Geophysicists

7555 Redwood Blvd  
P.O. Box 578  
Novato, CA 94948

Telephone  
415-892-0821  
Telex 340523

Alaska  
California

Hawaii  
Nevada

Texas  
Washington

- Percentages of peat content in upper mud to evaluate excavation conditions and suitability for reuse as fill
- Determine actual strength and consolidation characteristics of compacted mud fill, including evaluations for various degrees of compaction (75 to 80% vs. 90%)
- Determine settlement variations for design of surface drainage and underground utilities
- Confirm strength parameters and static/dynamic slope stability for design slopes, plus looking at alternative slope protection methods
- Soil engineering design parameters for building foundations and retaining walls
- Flexible pavement design thicknesses

Scope of Services

A. Field Exploration

1. We will explore the planned land areas with rotary-wash borings to achieve the depth required for determining full mud thickness of exploration and obtaining samples for testing. We propose 21 borings (500- to 800-foot spacing along the peninsulas) ranging from 50 to 80 feet deep. Total aggregate depth will be about 1400 feet requiring 11 days drilling.
2. We will explore the planned water areas using large-diameter bucket auger drilling equipment, with limited sampling, in order to more thoroughly observe peat and ground-water conditions. We plan 15 to 16 bucket-auger holes from 15 to 20 feet deep; total aggregate length will be approximately 300 feet requiring 3-1/2 to 4 days of drilling.
3. To supplement test borings with more continuous data regarding peat quantities, we will perform a geophysical conductivity survey in the upper 12 to 15 feet. Variations in conductivity will be correlated with peat quantities. We anticipate a grid spacing of approximately 100 to 200 feet for 90,000 linear feet requiring 6 days field work.

B. Laboratory Testing

We will perform moisture content/dry density, strength, classification, consolidation, and compaction tests to confirm the pertinent engineering

Memo - August 18, 1983  
Page 3

characteristics of both the natural mud and peat as well as compacted mud and peat (remolded samples).

#### C. Engineering Analysis and Evaluation

Our soil engineering analysis will be directed primarily toward evaluating settlement, slope stability, and excavation/compaction of bay mud. Our first level of effort will be to confirm previous recommendations and design guidelines, and to provide specific soil engineering recommendations and parameters required by the design team. The next level of effort will be to evaluate alternatives and special conditions where needed. The third level of engineering effort will be to respond to specific questions and concerns raised by either the design team or others during the project reviews and public hearings. The latter levels of effort will be performed only as requested or required.

Some of the specific tasks involved in the engineering analysis are as follows:

1. Review field logs and select samples for laboratory testing
2. Evaluate field and laboratory data to determine pertinent soil engineering characteristics
3. Determine various design conditions to be evaluated for settlement and slope stability
4. Perform computer-assisted analysis for various design situations
5. Evaluate results of analysis, and prepare specific conclusions and recommendations
6. Intermittent consultation with client and other design team members to provide data and recommendations as they become available. Attend meetings (public and private) to discuss soil engineering design considerations.
7. Report preparation, including graphics, technical writing and editing, and quality control reviews.

We anticipate several informal meetings with the client and consultants, and will record the results in intermittent memos and letters, as appropriate. Ultimately, we will consolidate all the geotechnical information into one formal report.

Memo - August 18, 1983  
Page 3

It is further recommended by the Department of the Army<sup>1</sup> that the final soil investigation should explicitly include the following three items:

- a: Performance of a detailed seismicity and ground response analysis with test data from results of tests on samples at the Cullinan Ranch site.
- b: Perform instrumented test fill/excavation to check computations and determine acceptable construction methods.
- c: Investigate stability of slopes in peat layers using a "wedge" method in addition to the circular arc method indicated in the preliminary Phase I soil investigation.

---

<sup>1</sup>William C. Angeloni, Chief, Planning/Engineering Division, San Francisco District, Corps of Engineers, letter of March 26, 1984 to Ann Merideth, Acting Planning Director, City of Vallejo.

## **APPENDIX K**

### **Bibliography for Vegetation and Wildlife Section**

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Appendix \_\_\_\_

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### Personal Communications

Carper, H.D. June 24, 1983. Director. California Department of Fish and Game. Letter to the City of Vallejo regarding Draft EIR/EIS, Cullinan Ranch.

Duke, Ron. January 13, 25, 1984. Wildlife Ecologist, Harvey & Stanley Associates, Alviso, CA. Telephone conversations.

Neuhausen, Carl. January 12, 1984. Director of Planning, W.R. Williams, Inc., Huntington Beach, CA. Telephone conversation.

Port, Patricia Sanderson. July 7, 1983. Regional Environmental Officer, U. S. Fish and Wildlife Service. Letter to Colonel E.M. Lee, Jr., Corps of Engineers regarding Draft EIR/EIS, Cullinan Ranch.

Pratt, Ruth R. January 20, 1984. Biologist, U. S. Fish and Wildlife Service, Division of Ecological Services, Sacramento, CA. Telephone conversation.

Swanson, James A. January 17, 20, 1984. Wildlife Biologist, California Department of Fish and Game, Region 3, Yountville, CA. Telephone conversations.

Tasto, Bob. February 1, 1984. Associate Marine Biologist, California Department of Fish and Game, Marine Resources, Menlo Park, CA. Telephone conversation.

## APPENDIX L

Appendix L consists of the Cullinan Ranch Wildlife Monitoring Program prepared for W.R. Williams, Inc. by Harvey & Stanley Associates.

Because of the length of the report and its fold-out graphics it is not included in this appendix package. Instead, it is incorporated by reference in accordance with section 15150 of the State CEQA Guidelines and 40 CFR Part 1502.21 of the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA. A summary of the report is included in the Vegetation and Wildlife Section of the Final EIR/EIS. The report is also available for inspection at the Vallejo City Planning Department, 555 Santa Clara Street, Vallejo, CA 94590.

It is also available for review at the San Francisco District, Corps of Engineers office at 211 Main Street, San Francisco, CA 94105.

**APPENDIX M**

**Biological Assessment prepared by Corps of Engineers  
as part of Section 7 of Endangered Species Act**



DEPARTMENT OF THE ARMY  
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS  
211 MAIN STREET  
SAN FRANCISCO, CALIFORNIA 94105

February 10, 1984

Environmental Branch

Mr. Gail Kobetich, Project Leader  
Sacramento Endangered Species Office  
U. S. Fish and Wildlife Service  
1230 "N" Street, 14th Floor  
Sacramento, California 95814

Dear Mr. Kobetich:

We are writing to request formal consultation under Section 7 of the Endangered Species Act regarding the effects of a regulatory permit action on two listed endangered species. Pan Pacific and Redwood Realty has applied for Department of the Army authorization under Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act to construct a water-oriented, predominantly residential community on 1493 acres near Vallejo, California. Our biological assessment for the proposed project is enclosed.

The Service initially provided our office with a list of endangered and candidate species that might occur in the area of the proposed development in a letter dated September 9, 1982. That list was last revised by the Service on January 20, 1984 (your reference SESO #1-1-82-SP-379R). The revised list includes four listed endangered species and four candidate species.

Our biological assessment found that the California clapper rail (Rallus longirostris obsoletus) and salt marsh harvest mouse (Reithrodontomys raviventris) may be affected by the proposed work, but that the peregrine falcon (Falco peregrinus anatum) and California brown pelican (Pelecanus occidentalis californicus) are not likely to be affected. We are therefore requesting your biological opinion regarding effects on the California clapper rail and salt marsh harvest mouse. Our biological assessment also addresses the four candidate species on the Service's list, the black rail (Laterallus jamaicensis coturniculus), salt marsh yellowthroat (Geothlypis trichas sinuosa), soft bird's beak (Cordylanthus mollis mollis), and Delta tule pea (Lathyrus jepsonii jepsonii), for the purpose of informal consultation.

Questions regarding this matter may be directed to Mr. Scott Miner of our Environmental Branch, (FTS 454-0446). Thank you for your assistance.

Sincerely,

Copy furnished:  
Mr. W. R. Williams, Inc.  
2130 Main St., Suite 230  
Huntington Beach, CA 92648

Robert R. Mooney  
Assistant Chief, Planning/Engineering

Enclosures

1. Biological Assessment
2. Cullinan Ranch DEIR/EIS  
(2 vol.)
3. Cullinan Ranch Wildlife Monitoring  
Program Final Report, Dec 7, 1983  
Harvey & Stanley Associates

## BIOLOGICAL ASSESSMENT

### Cullinan Ranch Specific Plan

Regulatory Permit Application No. 14775E57

#### Project Description

Pan Pacific and Redwood Realty has applied for Department of the Army authorization under Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act to construct a water-oriented, predominantly residential community on 1493 acres near Vallejo, California. The proposed development and its environmental effects are discussed in detail in the Draft Environmental Impact Report/Environmental Impact Statement for the Cullinan Ranch Specific Plan dated May 1983. For that reason, the following discussion is limited to aspects of the proposed development which are of special relevance to effects on endangered or candidate species.

Six of the eight species addressed by this assessment are obligatory marsh inhabitants. The major direct effects of the proposed development on marsh habitat would result from the placement of tide gates along South and Dutchman Sloughs and the excavation of a boat entrance channel connecting Dutchman Slough with the development's interior waterways. A permanent tide gate would be constructed near the northwestern end of the development to enhance tidal flushing of the proposed interior waterways. Although no detailed tide gate design is presently available, it is expected that the tide gate would consist of eight 72-inch diameter culverts placed through the levee. The tops of the culverts are expected to be between 0 and -2 feet MLLW; therefore, the tide gates are not expected to permanently displace any vegetated marsh habitat. If the placement of the culverts requires excavation of a trench through the levee, at least 48 linear feet of vegetation along the levee will be temporarily removed. The amount of marsh habitat temporarily disturbed will depend on the specific design and method of placement of the tide gates.

In addition to the single permanent tide gate, temporary tide gates would be placed through the South/Dutchman Slough levee at the western end of phases C, D, E and F of the development after the earthwork for each of the phases is completed. (See Figure 1 for the proposed phasing plan.) The purpose of the temporary tide gates would be to provide adequate flushing of the development's interior waterways during the projected 20 year build-out period. Each of the four temporary tide gates would probably be similar in design to the permanent tide gate, but might consist of fewer culverts due to the smaller volume of water needed to flush the initial phases of the development. Therefore, placement and removal of each of the temporary tide gates would temporarily disturb a linear span of levee and tidal marsh habitats less than or equal to the span impacted by the permanent tide gate. It is estimated by the applicant that each of the temporary tide gates would be in place for a period of three to five years.

The proposed entrance channel would bisect the existing levee along Dutchman Slough. The breach in the levee would be approximately 360 feet wide at mean sea level and would be excavated to a maximum depth of -30 feet MLLW.

Except for excavation of the entrance channel, the levee along South and Dutchman Sloughs would remain in place. No work is proposed on the outboard slope of the levee. The levee would be widened by the placement of fill material on its inboard slope and a pedestrian trail would be constructed along the entire crest of the levee west of the entrance channel. The crest and inboard slope of the levee along the trail would be landscaped with vegetation typical of levees in the area. East of the entrance channel, the crest of the levee would be landscaped as part of a public park.

The proposed development would introduce a large human population into a relatively isolated area where virtually no human population currently exists. The 4,500 residential units planned would house an estimated 11,400 people. Increased human and domestic animal activity could impact marsh habitat near the developed area. The marsh areas most accessible from the proposed Cullinan Ranch development would be those along the south side of Dutchman and South Sloughs. These marshes will be isolated from developed areas by artificial channels, but will be adjacent to a public trail and park. The marshes south of Cullinan Ranch will be separated from the development by Route 37, a landscape buffer, and a frontage road. Access to the marshes on Island No. 1 west of Cullinan Ranch will be restricted by their distance from the developed areas and, presumably, by the western landowners' efforts to prevent trespassing. The marsh areas north of Cullinan Ranch would not be accessible by foot or vehicle because of the sloughs which isolate those areas from Island No. 1. However, many of the residents and public users of the water-oriented Cullinan Ranch development would have access to boats. It is expected that the completed development will provide berths or other storage for 1,600 - 2,200 recreational boats. Boaters could reach areas throughout the Napa Marsh. Studies prepared for the developer have estimated that up to 107 boat trips per day could be added to the traffic in the Napa Marsh sloughs due to the proposed development. The project developer supports measures to control boater access to the Napa Marsh sloughs through speed limits or regulation of access. The means by which such measures could be implemented have not been determined.

The project developer has proposed the creation of 35-40 acres of tidal marsh on the inboard side of the South and Dutchman Slough levees. However, the technical report on shoreline protection prepared for the developer (See Appendix III.A. of the DEIR/EIS) indicates that it may become necessary at some future date to place riprap or other shoreline protection along the inboard side of the levee if excessive erosion occurs due to currents and waves. The developer has also proposed restoration of an 88-acre dredged material disposal area to tidal action to provide additional marsh habitat. However, the disposal area is not expected to be filled to capacity for 80 years and would not be available for habitat enhancement during that period. Therefore, neither of these proposed habitat mitigation measures are certain to be effective. The developer has also proposed the creation of an additional approximately 64 acres of levee shrub habitat along the inboard side of the levee along Dutchman and South Sloughs.

## SALT MARSH HARVEST MOUSE

### Species Account

The salt marsh harvest mouse (SMHM) (Reithrodontomys raviventris) is endemic to the marshes which border San Francisco, San Pablo, and Suisun Bays. Two subspecies of SMHM are recognized: R. r. raviventris, which occurs from the Carquinez Straits and southern Marin Peninsula to the southern end of San Francisco Bay; and R. r. halicoetes, which inhabits the marshes of Suisun and San Pablo Bays (Shellhammer and Harvey 1982). The two subspecies are listed as a single endangered species by both the Federal government and the State of California.

The primary habitat of the SMHM is the mid to upper pickleweed zone of salt and brackish marshes. Optimal SMHM habitat has 100% vegetative cover, a high percentage cover of pickleweed (60% or more), a cover height of 30-50 cm at the summer maximum, and includes a diverse mixture of higher marsh halophytes. A minimum of about 25 acres of contiguous habitat is necessary to maintain a healthy SMHM population. Productive SMHM habitat also has contiguous dense cover in which the mice can escape extreme high tides without excessive exposure to predation. This cover is best provided by a high marsh zone of peripheral halophytes (Shellhammer and Harvey 1982). SMHM may also move into grasslands adjacent to marshes during extreme high tides if dense cover is present (Fisher 1965).

Loss of habitat due to the diking and filling of wetlands has been the major factor contributing to the decline of the SMHM. Geographic isolation of small SMHM populations, resulting in genetic isolation, is an additional threat to the continued existence of the species (Shellhammer and Harvey 1982).

### Occurrence in the Project Vicinity

Schaub (1971) captured SMHM in the marsh south of Highway 37 about one mile southwest of the project site and at the west end of Island No. 1. The west end of Island No. 1 had the second highest population density encountered during Schaub's study. Cummings (1975) captured SMHM at four trap sites in the marsh south of Highway 37 between Sonoma Creek and Mare Island. The four trap sites included locations near the southwest and southeast corners of the project site. No trapping along the sloughs north of Island No. 1 was performed during Schaub's or Cummings' studies.

According to Shellhammer and Harvey (1982), SMHM occur along the Napa River north of the project site on Coon Island and in the Fagan Marsh. Shellhammer and Harvey also state that many of the marshes in the Napa Marsh are too narrow and steep to support SMHM and that the marsh south of Highway 37 is one of the major refugia for SMHM in San Pablo Bay.

Napa, South and Dutchman Sloughs have been proposed as essential habitat in the draft recovery plan for the SMHM (Shellhammer and Harvey 1982).

SMHM are not expected to occur in the interior portions of the Cullinan Ranch property. The only potential habitats for SMHM on the site are several swales and seepage areas which support small patches of pickleweed and other wetland vegetation. These swales and seepages are very poor SMHM habitat due to their lack of tidal action, sparse cover, small size, and separation from other marsh areas.

The marsh adjacent to the north side of the property along South and Dutchman Sloughs provides very limited SMHM habitat. Along most of the Cullinan Ranch property, this marsh is restricted to a narrow band along the base of the perimeter levee. In several areas along the levee the marsh becomes as wide as 180 feet. Most of this width is low marsh which is not SMHM habitat (Wondolleck *et al.* 1973). The total area of marsh along the outboard side of the Cullinan Ranch levee is about 25 acres. The marshes along the north side of South Slough opposite the Cullinan Ranch property are more extensive and could provide more valuable SMHM habitat.

During June 1983, an extensive trapping program was conducted along the outboard side of the levee along Dutchman and South Sloughs on the north side of the Cullinan Ranch property. Trapping was also performed in a small (less than three acre) diked wetland area at the northeast corner of the property. The trapping program and results are discussed in detail in the attached report by Harvey and Stanley Associates, Inc. (1983). A total of 2,385 trap nights over a 22-day period resulted in five captures of salt marsh harvest mice. All of the SMHM were captured during a single night along South Slough and the western end of Dutchman Slough. The results of the trapping program indicate that a low population of SMHM exists in these marshes and that SMHM probably do not exist along the more eastern portions of Dutchman Slough north of the Cullinan Ranch property.

#### Project Impacts

The only direct loss of habitat occupied by the SMHM due to the proposed Cullinan Ranch development would result from the placement of tide gates along South and Dutchman Sloughs. Placement of the tide gates, and subsequent removal of the temporary tide gates, would result in the temporary loss of tidal marsh and transition zone vegetation from a portion of the levee if excavation is required. The resulting unvegetated strip would act as a partial or complete barrier to SMHM movement along the levee until adequate cover regrows. (An open area 33 feet wide is believed to be sufficient to act as a barrier to SMHM movement (Shellhammer and Harvey 1982).)

The proposed development would also result in the destruction of approximately 1.2 acres of tidal brackish marsh due to the excavation of a boat channel connecting Dutchman Slough and the artificial channels within the development. However, the trapping program conducted in June 1983 indicates that SMHM probably do not occur in this area. The area of the proposed breach appears to be very marginal habitat for the SMHM because of the narrowness and patchiness of the pickleweed band along Dutchman Slough.

Although SMHM swim well, the proposed levee breach would impede the movement of SMHM along the south side of Dutchman Slough past the breach. This would tend to isolate any population of SMHM on the south side of Dutchman Slough east of the breach from populations west of the beach. No SMHM are known to occur along Dutchman Slough east of Cullinan Ranch, but the approximately 18-acre marsh just north of the western end of the Route 37 bridge over the Napa River could provide SMHM habitat.

Although the loss of agricultural field habitat due to the proposed development would not directly affect the SMHM, the development would eliminate the potential for future restoration of 1240 acres of former tidal marsh. The proposed project (or any other development of the project site) would therefore reduce future opportunities for increasing SMHM habitat.

Construction activities could affect SMHM habitat due to equipment noise, human activity in or adjacent to marsh areas, inadvertant dumping, or similar causes. Disturbance of SMHM habitat would be most likely during the initial earthmoving stages of construction and during the construction of pathways or other amenities on the crest of the Dutchman and South Slough levees. It is anticipated that these construction activities would occur intermittently at various locations over a 20-year period as different phases of the development are completed.

Increased human and domestic animal activity due to the proposed development could impact SMHM habitat near the developed area. The presence of SMHM populations near developed areas elsewhere around San Francisco Bay indicates that the species is able to tolerate considerable disturbance by humans and domestic animals. However, the degree to which those SMHM populations have been impacted by the adjacent development is not known. Boaters would cause occasional, incidental disturbance of SMHM habitat throughout the Napa Marsh. Also, waves generated by power boats could cause the erosion of marsh areas immediately adjacent to heavily-traveled sloughs. This erosion could destroy SMHM habitat.

The tidal marsh and transition zone habitat which the project developer proposes to create along the inboard side of the levee along Dutchman and South Sloughs could provide additional SMHM habitat. However, the value of that habitat to SMHM would probably be very low due to the narrowness of the proposed marsh zone.

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## CALIFORNIA CLAPPER RAIL

### Species Account

The California clapper rail (Rallus longirostris obsoletus) is listed as an endangered species by both the Federal government and the State of California. California clapper rails occur only in tidal salt and brackish marshes along the coast of California from Humboldt to San Luis Obispo Counties. The current breeding population of California clapper rails is almost entirely restricted to the San Francisco Bay area. Nesting begins in mid-March and extends into July. Most nests are built in the cordgrass zone of the marsh, often near tidal sloughs; however, the pickleweed zone is also often used as nesting habitat.

Small tidal sloughs are typically used as foraging habitat by California clapper rails. The food habits of clapper rails in the Napa marshes have not been studied; however, clapper rails in general feed largely on mollusks and arthropods. Good clapper rail habitat also includes a well-developed upper marsh zone which provides cover during high tides. Although clapper rails are generally secretive, they can become accustomed to the presence of humans.

Destruction of habitat due to the diking, filling, and draining of marshes is the primary threat to the continued existence of the California clapper rail (Shellhammer and Harvey 1982).

### Occurrence in the Project Vicinity

California clapper rails reside and breed along the major sloughs of the Napa Marsh, including Napa, South, and Dutchman Sloughs (Gould 1973, Harvey, et al. 1977, Gill 1979). No clapper rails have been reported from the marsh south of Highway 37 opposite the project site (Gould 1973, Harvey et al. 1977). Napa, South, and Dutchman Sloughs have been proposed as essential habitat in the draft recovery plan for the California clapper rail (Shellhammer and Harvey 1982).

Comprehensive ground avian transects (variable-strip Emlen transects) were conducted by Harvey and Stanley Associates on the Cullinan Ranch property at roughly biweekly intervals between August 1982 and July 1983. (This survey is described in greater detail in Appendix III. D. of the Cullinan Ranch DEIR/EIS). Transect #1 extended north along one mile of levee from the junction of South and Dutchman Sloughs to the extreme north end of the Cullinan Ranch property. This transect was surveyed during the entire twelve month study period. Transect #3 extended west along one mile of levee from the northeastern corner of the property and was surveyed from January 1983 to July 1983. (Transect #2 was located in the interior of the property and did not include any clapper rail habitat.) The transects were traversed in the evening at least once a month during the study period. A calling clapper rail was heard on one occasion in January 1983 along South Slough near the Napa/Solano County line (See Figure 2).

During June 1983 a survey specifically for clapper rails was also conducted by Harvey and Stanley Associates. On ten evenings taped clapper rail calls were replayed while the top of the levee along Dutchman and South Sloughs was traversed. A clapper rail response was heard along Dutchman Slough near the center of the Cullinan Ranch property on one occasion (See Figure 2).

Based on the results of these two surveys, it appears that California clapper rails exist in low numbers along the north side of the Cullinan Ranch property. Clapper rails are not expected to occur within the Cullinan Ranch site because it is completely isolated from tidal action and, therefore, contains no suitable habitat for the species.

#### Project Impacts

The proposed development would result in the direct loss of clapper rail habitat due to the excavation of an entrance breach connecting Dutchman Slough with the interior channels of the development. The entrance breach would be located in an area where the generally narrow marsh fringe along the slough levee increases in width to a maximum of about 130 feet. Approximately 1.2 acres of tidal brackish marsh which appears to be good clapper rail habitat would be destroyed. Placement and removal of tide gates along South and Dutchman Sloughs would also result in the temporary loss of clapper rail habitat if excavation is required. The proposed entrance breach and tide gates may also inhibit clapper rail movement along the South/Dutchman Slough levee. Although rails occasionally fly, their strong preference for remaining in dense cover would likely inhibit movement across the broad open areas created by the channel and, temporarily, by placement and removal of the tide gates. As a result, use of the marsh habitat along the South and Dutchman Sloughs by rails may be reduced.

Although the loss of agricultural field habitat due to the proposed development would not directly affect the California clapper rail, the development would eliminate the potential for future restoration of 1240 acres of former tidal marsh. The proposed project (or any other development of the project site) would therefore reduce future opportunities for increasing clapper rail habitat.

Construction activities could affect clapper rail habitat due to equipment noise, human activity in or adjacent to marsh areas, inadvertant dumping, or similar causes. Disturbance of clapper rail habitat would be most likely during the initial earthmoving stages of construction and during the construction of pathways or other amenities on the crest of the Dutchman and South Slough levees. It is anticipated that these construction activities would occur intermittently at various locations over a 20-year period as different phases of the development are completed. The potential for impacts on the clapper rail would be greatest during the nesting season. Inadvertant disturbance of nesting sites by construction activities could reduce the reproductive success of the local rail population.

Increased human and domestic animal activity due to the proposed development could impact clapper rail habitat near the developed area. The potential for impacts on clapper rails would be increased during high tides, due to the concentration of the rails on the upper slopes of the levees, and during the nesting season. The clapper rail nesting season (mid-March to mid-July)

overlaps the peak season for recreational boating and other outdoor activities. Boaters could cause disturbance of clapper rail habitat throughout the Napa Marsh. Also, waves generated by power boats could cause the erosion of clapper rail habitat immediately adjacent to heavily-traveled sloughs.

The presence of clapper rail populations near developed areas elsewhere around San Francisco Bay (Harvey 1980) indicates that the species is able to tolerate considerable disturbance by humans and domestic animals. However, the degree to which those rail populations have been impacted by the adjacent development is not known.

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## PEREGRINE FALCON

### Species Account

The peregrine falcon (Falco peregrinus anatum) once occurred throughout the lower 48 States, but is now considered one of the most endangered birds in the United States (U.S. Fish and Wildlife Service 1975). The population of peregrine falcons in California declined from at least 100 breeding pairs in the mid-1940's to five or fewer pairs in 1970 (Herman 1971, PCAPFRT 1982). The California population is now about 50-60 pairs and is the largest population in the U.S. (PCAPFRT 1982).

The peregrines' decline was primarily due to organochlorine pesticide contamination of its food chain which caused widespread reproductive failure due to the thinning of eggshells and changes in breeding behavior. Illegal shooting, illegal falconry activities, transmission line collisions and electrocutions, and human disturbance of nesting sites have been cited as additional reasons for the peregrines' decline and as impediments to its recovery (PCAPFRT 1982). Although DDT was banned from use in California in 1971, there is still considerable eggshell thinning among peregrines in the State (California Department of Fish and Game 1980, PCAPFRT 1982).

Peregrine falcons nest on high, rocky cliffs near water, marshes, or other areas attractive to passerine birds, mainly in woodland, forest, and coastal habitats (California Department of Fish and Game 1980, U.S. Fish and Wildlife Service 1975). Like most cliff-nesting raptors, peregrines tend to return to the same aeries (nest sites) each year. Some peregrines remain in the area of their aeries all year, while others move to other areas during the winter (Mallette and Gould 1976). Peregrines occur statewide during migration and in winter. Although little is known of the winter habitat needs of peregrines, marshes and riparian areas are known to be especially important habitat during the non-breeding season (California Department of Fish and Game 1980, PCAPFRT 1982).

The diet of peregrine falcons consists almost entirely of birds, particularly pigeons, shorebirds, and songbirds. The prey species taken are generally the most common species in the area (Mallette and Gould 1976, Harlow 1982). The foraging range of nesting peregrines may extend up to 20 miles from the nest site (Verner and Boss 1980).

### Occurrence in the Project Vicinity

Peregrine falcons occur in the Napa Marsh only as a winter visitor (Harvey, et al. 1977, Madrone Assoc. 1977). The closest known nesting site is about 30 miles north of the project site in the Palisades-Table Rock area north of Calistoga in Napa County (U.S. Fish and Wildlife Service 1975, Harlow 1982).

### Project Effects

The development of Cullinan Ranch is not expected to increase or prolong any of the factors which have been cited as causes for the decline of the peregrine falcon or as impediments to its recovery. Loss of agricultural field habitat due to the project may reduce the populations of some bird species on which peregrines prey. However, there is no available

information which indicates that the abundance of prey species in winter habitats is a factor which limits the population of peregrine falcons or that the Cullinan Ranch area is important as a foraging area for peregrines. Therefore, the peregrine falcon is not likely to be affected by the proposed project.

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## CALIFORNIA BROWN PELICAN

### Species Account

The California brown pelican (*Pelecanus occidentalis californicus*) is listed as an endangered species by both the Federal government and the State of California. California brown pelicans occur along the Pacific Coast from northern Mexico to southern British Columbia (CDFG 1980). Breeding occurs off the coast of southern California and northern Mexico, and in the Gulf of California, between February and August. Anacapa Island in the Santa Barbara Channel is currently the northern-most breeding site (Briggs et al. 1981). Until 1959, brown pelicans nested as far north as Bird Island in Monterey Bay (Gress 1970, Sowls et al. 1980). Northward migration from the breeding grounds generally begins in late spring and continues as late as August, but is concentrated in June and July (Gress 1970). Brown pelicans occur in the San Francisco Bay Area from late spring through early winter (Harvey et al. 1977, Harvey and Stanley Assoc. 1983). Southward migration to the pelicans' breeding grounds generally occurs in November and December. The timing of this migration pattern is apparently quite variable depending upon climate and oceanographic conditions (CCMS 1981).

The brown pelican is usually found in flocks in open water coastal environments, including open bays, although a few individuals are occasionally seen in enclosed bodies of water (CDFG 1980, Harvey and Stanley Assoc. 1983). Brown pelicans feed primarily on schools of small fish at the ocean's surface which they catch by plunging into the water (Keith 1983, Sowls et al. 1980). In northern and central California, brown pelicans forage up to 75 km from the mainland; however, most pelicans are found within 20 km of the coast. Brown pelicans roost on land at night, with most of the birds concentrated in a few large roosts (CCMS 1981).

Brown pelicans occur within San Francisco Bay from extreme southern San Francisco Bay to upper San Pablo Bay. The pelicans which occur in the Bay are concentrated in the central part of the Bay (Harvey et al. 1977). The number of brown pelicans within the Bay is very low, however, compared to the thousands of brown pelicans which occur along the open coast and on the Farallon Islands (CCMS 1981).

The reproductive success of brown pelicans in California and northern Mexico declined precipitously in the late 1960's and early 1970's due to high levels of organochlorine pesticides, particularly DDE (the principal metabolite of DDT), in the marine environment. Biomagnification of DDE concentrations caused thinning of the shells of eggs of brown pelicans (Sowls et al. 1980). Eggshell thinning resulted in nearly complete failure of brown pelican reproduction in southern California in 1969 (Gress 1970). Brown pelican reproductive success improved following the introduction of new controls on the release of DDT into the environment in the early 1970's. However, DDE concentrations have stabilized at lower levels and brown pelican reproduction is still considered to be lower than normal (Sowls et al. 1980, CDFG 1980). No published estimate of the total current population of the California brown pelican is available; however, an estimated 94,000 brown pelicans were present in the Southern California Bight in the fall of 1977 (Briggs et al. 1981).

Even under normal conditions, brown pelican populations and breeding success vary considerably from year to year due to changes in oceanographic conditions and the abundance of forage fish (Gress 1970, Sowls et al. 1980, Briggs et al. 1981). The depletion of fish stocks due to commercial harvesting has been cited as a threat to the continued existence of the California brown pelican (Sowls et al. 1980, Keith 1983). Other factors which may impede the continued recovery of the brown pelican are human disturbance of nesting colonies and oil spills (CDFG 1980, Sowls et al. 1980, Briggs et al. 1981).

#### Occurrence in the Project Vicinity

Brown pelicans occasionally occur in northern San Pablo Bay in low numbers from late spring through early winter. Harvey and Stanley Associates (1983) conducted aerial surveys over the Cullinan Ranch property, the northeast edge of San Pablo Bay, the Napa River, and the sloughs and salt ponds of the Napa Marsh from October 1982 to May 1983. Eighteen flights were made at approximately ten day intervals during that eight month period. Brown pelicans were recorded during the aerial survey on two occasions. On December 1, ten brown pelicans were recorded on the salt pond across Dutchman Slough from Cullinan Ranch and one brown pelican was seen near the confluence of South Slough and the Napa River. On December 15, five brown pelicans were recorded in the same salt pond and four brown pelicans were sighted along the Napa River in the general vicinity of the American Canyon sanitary landfill.

Brown pelicans are expected to occasionally occur elsewhere in the salt ponds and sloughs of the Napa Marsh. No brown pelicans are expected to occur within the Cullinan Ranch property (except for occasional over flights) because it contains no suitable habitat for the species.

#### Project Effects

The development of Cullinan Ranch is not expected to increase or prolong any of the factors which have been cited as causes for the decline of the California brown pelican or as impediments to its recovery. Increased human activity, particularly boating, may reduce the occasional use of sloughs in the Napa Marsh by brown pelicans for resting. However, there is no available information which indicates that the availability of resting habitat is a factor which limits the population of brown pelicans or that the sloughs of the Napa Marsh are important habitat for brown pelicans. Therefore, the California brown pelican is not likely to be affected by the proposed project.

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## CALIFORNIA BLACK RAIL

### Species Account

- The California black rail (Lateralus jamaicensis coturniculus) is not currently listed as endangered or threatened under the Endangered Species Act; however, the black rail is listed as a rare species by the State of California and is a candidate species for protection under the Federal law (Calif. Dept. Fish and Game 1980, Sweeney 1982).

Black rails occur in coastal salt marshes from Tomales Bay to northern Baja California and in inland brackish and freshwater marshes, including those of the Sacramento-San Joaquin Delta and the lower Colorado River. The continued existence of the California black rail may be threatened by the loss of wetland habitat in these areas (Calif. Dept. Fish and Game 1980, Wilbur 1974).

Until recently, black rails were generally not believed to breed in the San Francisco Bay Area. Recent observations of adult birds in Bay marshes during the breeding season have lead several researchers to conclude that black rails may breed in the area; however, nesting in the Bay Area has not been confirmed (Harvey et al. 1977, Madrone Assoc. 1977, Manolis 1977, Wilbur 1974). Black rail nests are rarely reported from any location. According to Wilbur (1974), no nests have been reported since 1955. Black rail nests are usually located only slightly above ground or water level, but may be situated up to fifteen inches above ground level (Wilbur 1974).

Within the San Francisco Bay Area, black rails occur in salt and brackish tidal marshes dominated by pickleweed or bulrushes. Eighty-seven percent of the black rails recorded during Manolis' 1977 breeding season survey of Central California occurred in marshes where pickleweed was a dominant species. All but one of the locations where black rails were recorded were marshes in which pickleweed and/or bulrushes were dominant species (Manolis 1977). Black rails prefer the high, infrequently inundated portions of these marshes (Harvey et al. 1977, Manolis 1977). Manolis also found that black rails frequently occur in the immediate vicinity of tidal sloughs.

### Occurrence in the Project Vicinity

No records of black rails in the Napa Marsh prior to 1976 are known to exist (Manolis 1977). In 1976, black rails were recorded by the Department of Fish and Game about five miles north of the project site near Fagan Slough. Manolis (1977) found black rails in the marsh south of Highway 37 about one mile west of the project site and in South Slough near the west end of the project site. Black rails were also found elsewhere in the Napa Marsh at the Tolay Creek marsh, on Napa Slough, and along the Napa River at White and South Sloughs. Black rails are not expected to occur within the diked portions of the project site because of the absence of tidal marsh habitat.

### Project Effects

The proposed development would result in the direct loss of probable black rail habitat due to the excavation of a marina entrance connecting Dutchman Slough with the interior channels of the development. The marina channel would be located in an area where the generally narrow marsh fringe along the slough levee increases in width to a maximum of about 130 feet. Approximately 1.2 acres of tidal brackish marsh which appears to contain good black rail habitat would be destroyed.

Placement and removal of tide gates along South and Dutchman Sloughs would also result in the temporary loss of probable black rail habitat if excavation is required. The proposed marina entrance and tide gates may inhibit black rail movement along the South/Dutchman Slough levee. Although rails occasionally fly, their strong preference for remaining in dense cover would likely inhibit movement across the broad open areas created by the channel and, temporarily, by placement and removal of the tide gates. As a result, use of the marsh habitat along the south side of South and Dutchman Sloughs by rails may be reduced.

Although the loss of agricultural field habitat due to the proposed development would not directly affect the black rail, the development would eliminate the potential for future restoration of 1240 acres of former tidal marsh. The proposed project (or any other development of the project site) would therefore reduce future opportunities for increasing black rail habitat.

Construction activities could affect black rail habitat due to equipment noise, human activity in or adjacent to marsh areas, inadvertent dumping, or similar causes. Disturbance of black rail habitat would be most likely during the initial earthmoving stages of construction and during the construction of pathways or other amenities on the crest of the Dutchman and South Slough levees. It is anticipated that these construction activities would occur intermittently at various locations over a 20-year period as different phases of the development are completed.

Increased human and domestic animal activity due to the proposed development could impact black rail habitat near the developed area. The potential for impacts on the black rail would be increased during high tides due to the concentration of the rails on the upper slopes of the levees. Boaters could cause occasional, incidental disturbance of black rail habitat throughout the Napa Marsh. Waves generated by power boats could cause the erosion of marsh areas immediately adjacent to heavily-traveled sloughs, resulting in the loss of black rail habitat.

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## SALT MARSH YELLOWTHROAT

### Species Account

The salt marsh yellowthroat (Geothlypis trichas sinuosa) is not currently listed as endangered or threatened under the Endangered Species Act, or as endangered or rare under the California Endangered Species Act; however, the salt marsh yellowthroat is a candidate species for protection under the Federal law (Calif. Dept. Fish and Game 1980, U.S. Fish and Wildlife Service 1982).

The salt marsh yellowthroat is a small warbler which breeds only in fresh and brackish marshes surrounding San Francisco Bay east to Carquinez Strait and along the Pacific Coast from Tomales Bay to Pescadero Marsh (Foster 1977). During the winter (late September to mid-March) salt marsh yellowthroats scatter to coastal marshes as far south as San Diego County, but some remain in the San Francisco Bay region throughout the year (Bent 1953, Foster 1977). Many of the resident yellowthroats move from fresh and brackish marshes to bayward salt marshes in the fall. During the winter, salt marsh yellowthroats are more often found in salt, rather than fresh or brackish, marshes (Foster 1977).

Yellowthroats prefer habitat with dense, tangled vegetation which provides constant concealment. Nest sites may be built on or above the ground, or over water, and are typically located in the densest, most concealing vegetation available. In the Napa Marsh salt marsh yellowthroats prefer as nesting sites areas where Scirpus olneyi grows along the edge of channels adjacent to levee slopes with mixed vegetation (Foster 1977). According to Foster, "the best yellowthroat habitat is along the edges of the smaller channels, or in places where the dumping of dredge spoils has encouraged dense weedy plant cover."

Salt marsh yellowthroats feed on a wide variety of insects, but are not known to eat any vegetative matter (Foster 1977). Yellowthroats are apparently relatively sensitive to human disturbance. The salt marsh yellowthroat has been described as generally secretive and "habitually suspicious." The subspecies flushes at fairly long distances from humans and readily abandons unfinished nests if disturbed (Schussler 1918).

The total breeding population of salt marsh yellowthroats has been estimated to be 230 pairs (Foster 1977). This population level was estimated by Foster to be a 80-95% reduction from historic levels based primarily on the percentage of the area of suitable habitat which has been destroyed during the past century. The loss of an estimated 90% of the historic freshwater marsh around San Francisco Bay (Walton 1975 fide Foster 1977) has been particularly detrimental to the salt marsh yellowthroat. Other potential threats to the continued existence of the salt marsh yellowthroat, in addition to the direct destruction of habitat, include the interruption of freshwater flows in breeding areas due to water diversions or drought and the fragmentation of habitat leading to genetic isolation of local populations (Harvey et al. 1977, Foster 1977). There are indications that the salt marsh yellowthroat maintains some degree of nesting site fidelity from year to year and may not readily utilize new nesting habitat (Foster 1977). Nesting site fidelity could exacerbate the problem of genetic isolation.

### Occurrence in the Project Vicinity

The non-breeding season distribution and habitat requirements of the salt marsh yellowthroat have not been reported in detail in the literature; however, the salt marsh yellowthroat apparently could be expected to occur in salt and brackish marshes throughout the Napa Marsh during the non-breeding season.

During the breeding season, the distribution of the salt marsh yellowthroat is more restricted. Foster (1977) conducted a comprehensive survey of yellowthroat nesting sites and found seven sites in the Napa Marsh area. Five of the sites were located several miles northwest of the Cullinan Ranch property along the smaller, fresher sloughs at the upper end of the marsh. A sixth site was located on the east side of Coon Island, alongside the Napa River, several miles north of Cullinan Ranch. The nesting site closest to the project site was located along the east side of the Napa River near the mouth of Austin Creek, roughly one-third of a mile from the mouth of Dutchman Slough. This seventh site apparently receives fresh water from the Vallejo sewer outfall. The Napa Marsh as a whole had a much larger breeding population of salt marsh yellowthroats than any other area within the entire breeding range of the subspecies.

Salt marsh yellowthroats have recently been observed by the project developer's biological consultants in the tidal marsh and on the outboard slope of the levee along Dutchman Slough adjacent to the Cullinan Ranch site (Harvey *et al.* 1982, Harvey and Stanley Assoc. 1983). No nesting activity adjacent to the site has been observed by the consultants during the past two breeding seasons. Salt marsh yellowthroats are not expected to occur within the Cullinan Ranch site because it contains no suitable habitat for the species.

### Project Effects

The proposed development would result in the direct loss of salt marsh yellowthroat habitat due to the excavation of an entrance breach connecting Dutchman Slough with the interior channels of the development. The entrance breach would remove approximately 360 linear feet of tidal brackish marsh and levee vegetation along Dutchman Slough which likely provides yellowthroat habitat. Placement and removal of tide gates along South and Dutchman Sloughs would also result in temporary loss of yellowthroat habitat if excavation is required.

Although the loss of agricultural field habitat due to the proposed development would not directly affect the salt marsh yellowthroat, the development would eliminate the potential for future restoration of 1240 acres of former tidal marsh. The proposed project (or any other development of the project site) would therefore reduce future opportunities for increasing yellowthroat habitat.

Construction activities could affect yellowthroat habitat due to equipment noise, human activity in or adjacent to marsh areas, inadvertent dumping, or similar causes. Disturbance of yellowthroat habitat would be most likely during the initial earthmoving stages of construction and during the construction of pathways or other amenities on the crest of the Dutchman and South Slough levees. It is anticipated that these construction activities would occur intermittently at various locations over a 20-year period as different phases of the development are completed.

Increased human and domestic animal activity due to the proposed development could impact yellowthroat habitat near the developed area. Boaters could cause disturbance of yellowthroat habitat throughout the Napa Marsh. Waves generated by power boats could cause the erosion of salt marsh yellowthroat habitat immediately adjacent to heavily-traveled sloughs.

The tidal marsh and levee shrub habitat which the project developer proposes to create along the inboard side of the levee along Dutchman and South Sloughs could provide additional habitat for the yellowthroat. However, human activity along the proposed trail on the crest of the levee may limit the value of that habitat to the salt marsh yellowthroat.

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## SOFT BIRD'S BEAK

### Species Account

The soft bird's beak (Corylanthus mollis ssp. mollis) is not currently listed as endangered or threatened under the Endangered Species Act; however, the soft bird's beak (also known as the "soft-haired bird's beak" and "narrow soft bird's beak") is listed as a rare plant species by the State of California and is a candidate species for protection under the Federal law (Calif. Dept. Fish and Game 1982, Madrone Assoc. 1977, Sweeney 1982).

The taxonomy of Cordylanthus mollis and closely related taxa has been subject to varying interpretation by recent botanical researchers. Pennell (1951) and Munz (1973) draw distinctions among C. mollis, C. palmatus, C. hispidus (C. mollis var. viridis Jeps.), and C. canulosus (C. palmatus ssp. canulosus of Munz). Mason (1957), however, viewed these four taxa as a single species, C. mollis, and stated that it was "perhaps best to regard this exceedingly variable complex as being in an active state of speciation with minor habitat races becoming evident." Chuang and Heckard (1973) have proposed a taxonomic revision of the subgenus Hemistegia based on evidence from morphology, chromosome numbers, habitat, ecology, and geographic distribution. Their taxonomy divides C. mollis into two subspecies: C. m. ssp. mollis, the subject of this account; and C. m. ssp. hispidus. Chuang and Heckard recognize C. palmatus (including C. canulosus of Pennell) as a distinct species with no subspecific divisions.

Soft bird's beak is a 25-40 cm tall annual herb which is usually sparingly branched (Chuang and Heckard 1973, Munz 1973). Like other species of the subgenus Hemistegia, soft bird's beak is halophytic and is probably a facultive hemiparasite (Chuang and Heckard 1971, 1973). Soft bird's beak is narrowly endemic to the tidal brackish marshes surrounding San Pablo and Suisun Bays, where it occurs only in the higher marsh zone (Calif. Native Plant Society 1980, Chuang and Heckard 1973, EDAW and WESCO 1981, Howell 1949, Madrone Assoc. 1977).

Soft bird's beak was reported to be possibly or probably extinct by the California Native Plant Society and the Smithsonian Institution in 1974 and 1978, respectively, because the subspecies had not been collected or reported since 1966 (Ayensu and DeFilipps 1978, Chuang and Heckard 1973, Powell 1974). Since 1974, soft bird's beak has been reported from several scattered locations around San Pablo and Suisun Bay (Calif. Native Plant Society 1980, EDAW and WESCO 1981). Insufficient information on soft bird's beak is available to conclusively determine the subspecies' population trend or the cause of any population decline which may have occurred. Loss of habitat due to the extensive filling, diking, and draining of wetlands in northern San Francisco Bay undoubtedly reduced the population of soft bird's beak since the turn of the century. Chuang and Heckard (1973) suggested that pollution might be contributing to the apparent decline of soft bird's beak because the population of the subspecies appeared to be declining more

rapidly than could be attributed solely to the loss of habitat. Increases in the salinity of tidal marshes within the range of the soft bird's beak due to upstream water withdrawals has been suggested as an additional threat to the continued existence of the species (EDAW and WESCO 1981). Soft bird's beak has recently been reported to be increasing or stable in number (Calif. Native Plant Society 1980), but that assessment was apparently based on very limited information.

The location and size of soft bird's beak colonies vary considerably from year to year. It is apparently not unusual for a local population of this annual species to be large one year and absent the next (EDAW and WESCO 1981). The reason for these fluctuations is not known.

#### Occurrence in the Project Vicinity

Little has been published about the distribution or specific habitat requirements of the soft bird's beak. Based on the limited information available, soft bird's beak could occur in the marsh across Highway 37 from the project site and along the sloughs of the Napa Marsh. A population of soft bird's beak was found on the outboard side of the levee along the north side of the Cullinan Ranch property in July 1982 during an initial vegetation survey by Harvey and Stanley Associates. The population was located approximately 1000 feet northwest of the junction of South and Dutchman Sloughs (See Figure 3) and consisted of approximately 50 plants. A more exhaustive two-day botanical survey of the levee was conducted in the spring of 1983 by Dr. Wayne Savage, curator of the Sharsmith Herbarium of San Jose State University. No specimens of soft bird's beak were found during Dr. Savage's survey. Apparently soft bird's beak, which is an annual, grew on the levee during the 1982 season, but did not grow there in 1983. Because of the recent growth of soft bird's beak on the Cullinan Ranch levee, it can be assumed that the species is very likely to grow on the levee in the future.

#### Project Effects

The proposed development would result in the direct loss of potential soft bird's beak habitat due to the excavation of a boat channel connecting Dutchman Slough with the interior channels of the development. The levee breach would be approximately 360 feet wide at mean sea level. Placement of tide gates along South and Dutchman Sloughs could also result in the direct, temporary loss of potential soft bird's beak habitat.

Although the loss of agricultural field habitat due to the proposed development would not directly affect the soft bird's beak, the development would eliminate the potential for future restoration of 1240 acres of former tidal marsh. The proposed project (or any other development of the project site) would therefore reduce future opportunities for increasing soft bird's beak habitat.

Construction activities could affect soft bird's beak habitat due to human activity in marsh areas, inadvertant dumping, or similar causes. Disturbance of soft bird's beak habitat would be most likely during the initial earthmoving stages of construction and during the construction of pathways or other amenities on the crest of the Dutchman and South Slough levees. It is anticipated that these construction activities would occur intermittently at various locations over a 20-year period as different phases of the development are completed.

Waves generated by power boats could cause the erosion of marsh areas immediately adjacent to heavily-traveled sloughs. Such erosion could impact the soft bird's beak if it is severe enough to affect the high marsh zone.

The project developer supports the recommendation of their biological consultant that an attempt be made to propagate soft bird's beak on the Cullinan Ranch levee. Successful propagation of the subspecies could offset losses of soft bird's beak habitat due to placement of tide gates, excavation of the entrance channel, and other construction activities.

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## DELTA TULE PEA

### Species Account

The Delta tule pea (Lathyrus jepsonii ssp. jepsonii) is not currently listed as endangered or threatened under the Endangered Species Act, or as endangered or rare under the State of California's Native Plant Protection Act; however, the Delta tule pea is a candidate species for protection under the Federal law (Calif. Dept. Fish and Game 1982, U.S. Fish and Wildlife Service 1980).

The Delta tule pea is a climbing perennial herb which typically produces several stems up to six feet long. It can grow in large tangled masses or individually and often twines around other plants for support. The tule pea grows in tidally influenced brackish and freshwater wetlands, typically at the water's edge. Its range extends east from the Napa marshes through Suisun Bay and the Sacramento-San Joaquin Delta to Stockton and Walnut Grove (EDAW and WESCO 1981).

The Delta tule pea occurs in numerous locations throughout much of the upper Bay and Delta. Its population has recently been estimated to be at least in the tens of thousands (EDAW and WESCO 1981). The total population of the tule pea has evidently been reduced from historic levels by the extensive diking and draining of wetlands in the Delta for agricultural and other purposes. However, the California Native Plant Society has reported that the population of the Delta tule pea is either stable or increasing (Calif. Native Plant Society 1980). Extensive levee modifications or alterations of the water regime of the Delta presumably could threaten the continued existence of the tule pea.

### Occurrence in the Project Vicinity

The Delta tule pea was observed growing on the outboard side of the Cullinan Ranch property along Dutchman and South Sloughs in 1982 (Harvey et al. 1982). This appears to be the first site-specific report of the Delta tule pea west of the Napa River, although both Mason (1957) and Munz (1973) state that the subspecies' range includes San Pablo Bay. In the spring of 1983 a botanical survey of the Cullinan Ranch levee was conducted by Dr. Wayne Savage, curator of the Sharsmith Herbarium of San Jose State University. Dr. Savage located and mapped 25 groups of Delta tule pea plants (See Figure 4). The groups are distributed fairly uniformly along almost the entire outboard side of the Cullinan Ranch levee. The occurrence of the Delta tule pea in other areas in the vicinity of the Cullinan Ranch properly has not been determined. However, because of the extensive occurrence of the tule pea on the Cullinan Ranch levee, the tule pea is expected to also occur along the outboard side of levees elsewhere in the Napa Marsh where environmental conditions are similar.

### Project Impacts

The only direct loss of habitat presently occupied by the Delta tule pea due to the proposed Cullinan Ranch development would result from the placement of tide gates along South and Dutchman Sloughs. Because the exact locations of the four temporary tide gates have not been specified, it is not possible to determine whether any existing group of tule peas would actually be impacted by placement of the temporary tide gates. Groups of tule peas are located near the northwestern corners of phases E and F of the proposed development, so it is likely that the placement of the temporary tide gates associated with those phases would destroy some tule peas. The proposed permanent tide gate would be located in a portion of the levee which currently supports a group of tule peas; therefore, it is likely that placement of the permanent tide gate would result in the destruction of some tule pea plants.

Placement of the temporary and permanent tide gates and excavation of the boat entrance channel could also result in the destruction of new tule pea plants which become established on the Cullinan Ranch levee during the projected 20-year construction period. The entrance channel would permanently remove approximately 360 linear feet of potential tule pea habitat.

Although the loss of agricultural field habitat due to the proposed development would not directly affect the Delta tule pea, the development would eliminate the potential for future restoration of 1240 acres of former tidal marsh. The proposed project (or any development of the project site) would therefore reduce future opportunities for increasing tule pea habitat.

Construction activities could affect Delta tule pea habitat due to human activity in marsh areas, inadvertent dumping, or similar causes. Disturbance of tule pea habitat would be most likely during the initial earthmoving stages of construction and during the construction of pathways or other amenities on the crest of the Dutchman and South Slough levees. It is anticipated that these construction activities would occur intermittently at various locations over a 20-year period as different phases of the development are completed.

Waves generated by power boats could cause the erosion of marsh areas immediately adjacent to heavily-traveled sloughs. Such erosion could impact the Delta tule pea if it is severe enough to affect the high marsh zone.

The project developer supports the recommendation of their biological consultant that revegetation of the Cullinan Ranch levee should include means of introducing the Delta tule pea along both sides of the levee. Successful propagation of the tule pea could offset losses of tule pea habitat due to placement of tide gates, excavation of the entrance channel, and other construction activities.

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APPENDIX IV. N.

Addendum to the RMA/Krone Report titled Cullinan Ranch Development  
Project Responses to Comments on the Draft EIR/EIS, August 1983

CULLINAN RANCH DEVELOPMENT PROJECT  
RESPONSES TO COMMENTS ON THE DRAFT EIR/EIS

for

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August, 1983

## TABLE OF CONTENTS

<u>Subject</u>	<u>Page</u>
INTRODUCTION	1
HYDRAULIC CONDITIONS IN PROJECT AND ADJACENT WATERS	2
Stage A Only	2
Completion of Stage C without Tide gates	8
Completion of Stage C with a Tide gate	8
Completion of Stage D with Tide Gate Remaining in Stage C	8
Completion of Stage D with Tide Gate at West End of Stage D	13
The Completed Project	13
Discussion	18
WATER QUALITY	23
Anticipated Algae Concentrations	23
Salinities	25
Dissolved Oxygen	25
Toxic Materials	26
Maintenance of Water Quality	26
Erosion Control	26
EFFECTS OF CULLINAN RANCH ON DUTCHMAN SLOUGH	28
DISPOSAL OF DREDGED SEDIMENT	29

## INTRODUCTION

The study, WATER CIRCULATION, SEDIMENTATION, AND ALGAE GROWTH, was conducted during the planning phases of the Cullinan Ranch Development Project to assure a project configuration that would maximize water circulation and minimize sedimentation. The study included evaluation of algae growth when the project depths were the minimum that would occur before maintenance dredging begins. Modifications to the planned project were found to be desirable after the study was completed. These include reducing the number of side channels, widening the side channels, and reducing the lengths of some of the side channels. The constructed depths of the channels were also deepened. These modifications were not expected to have deleterious impacts on water quality. Responses to the EIR/EIS, however, included questions about the effects of these modifications. This report presents the results of additional studies that were made to show the anticipated range of conditions that will prevail during the interim and completed phases of the development.

The responses to the EIR/EIS also include questions about sedimentation in Dutchman Slough, water quality impacts of construction and of maintenance dredging, planned water quality control measures, and impacts of the project on wildlife habitat on project margins and the margins of Dutchman Slough between the entrance and the Napa River. This report also addresses these questions.

## HYDRAULIC CONDITIONS IN PROJECT AND ADJACENT WATERS

Average residence times in project waters and currents in adjacent sloughs were calculated using the RMA link-node model. This model has the longest history of use in the San Francisco Bay system and delta of any mathematical model. It was extended up the Napa River and through the sloughs in the vicinity of the project as shown in Figure 1. The currents were calculated as the average current over each "link". Both advection and diffusion due to tidal currents were included in the calculation of the transport of dissolved materials used to determine average residence times, so that the effect of waters leaving and subsequently returning to the project was included. A mean tide was used for the calculations.

The link-node representation of the interior of the project is shown in Figure 2. The cross-sections of each channel were calculated. Channel slopes used in the calculations were 1:5 above mean lower low water (MLLW) and 1:4 below. Widths were measured on a plot having a scale of 50 feet per inch. The dimensions of the Dutchman Slough channel between the project and Napa River were a 200 foot bottom width and side slopes of 1:3, with a 10 ft MLLW depth.

Planned stages of development of the Cullinan Ranch Project are shown in Figure 3. The first stage, stage A, includes a large marina and a single side channel. Subsequent stages include a wide channel extending along the north edge of the project and lateral channels that provide shores around the residential areas. Stages of development were selected for modelling that would provide descriptions of the ranges of conditions to be expected. The results of modelling each of these configurations are presented separately below.

### Stage A Only

The water depth in the marina used in the calculations for this stage was 30 ft MLLW, and that in the side channel was 20 ft MLLW.

Average retention times found for this configuration range from 6 to 10 days. The distribution of flushing is shown in Figure 4. There are no "dead" areas, which combined with this rapid flushing, assures continuing exchange of project waters with slough and river waters.

Currents in Dutchman Slough between the project and Napa River and up-slough from the entrance now and those after construction of Stage A are presented in Figure 5. The currents shown for the project are only slightly higher than those existing now.

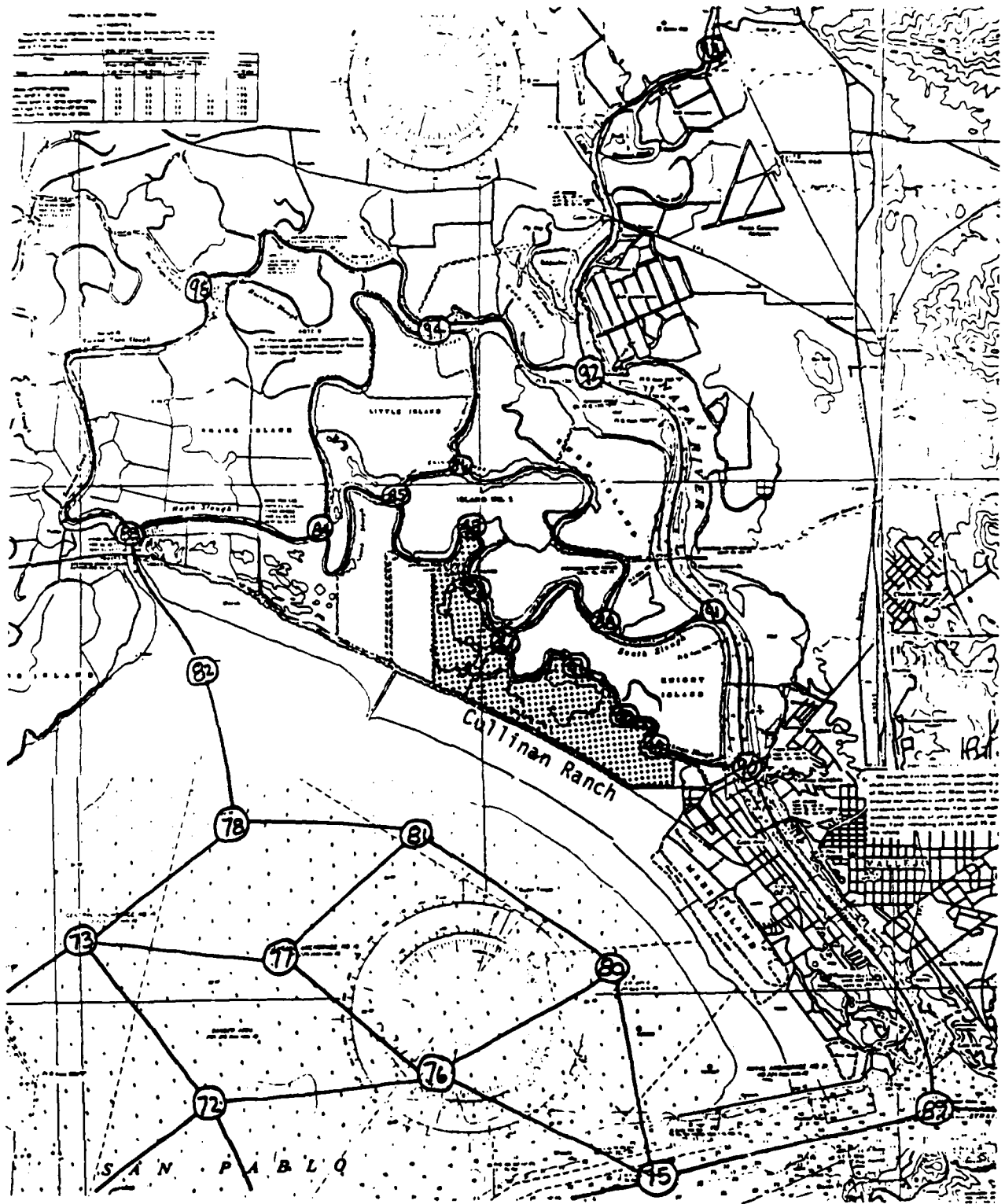


FIGURE 1

LINK NODE REPRESENTATION OF THE SLOUGHS AND  
SAN PABLO BAY IN THE VICINITY OF  
THE CULLINAN RANCH DEVELOPMENT

# CULLINAN RANCH • PROPOSED DEVELOPMENT PLAN

Figure 2

MODEL REPRESENTATION OF THE CULLINAN RANCH WATERWAYS

# PRELIMINARY PHASING PLAN

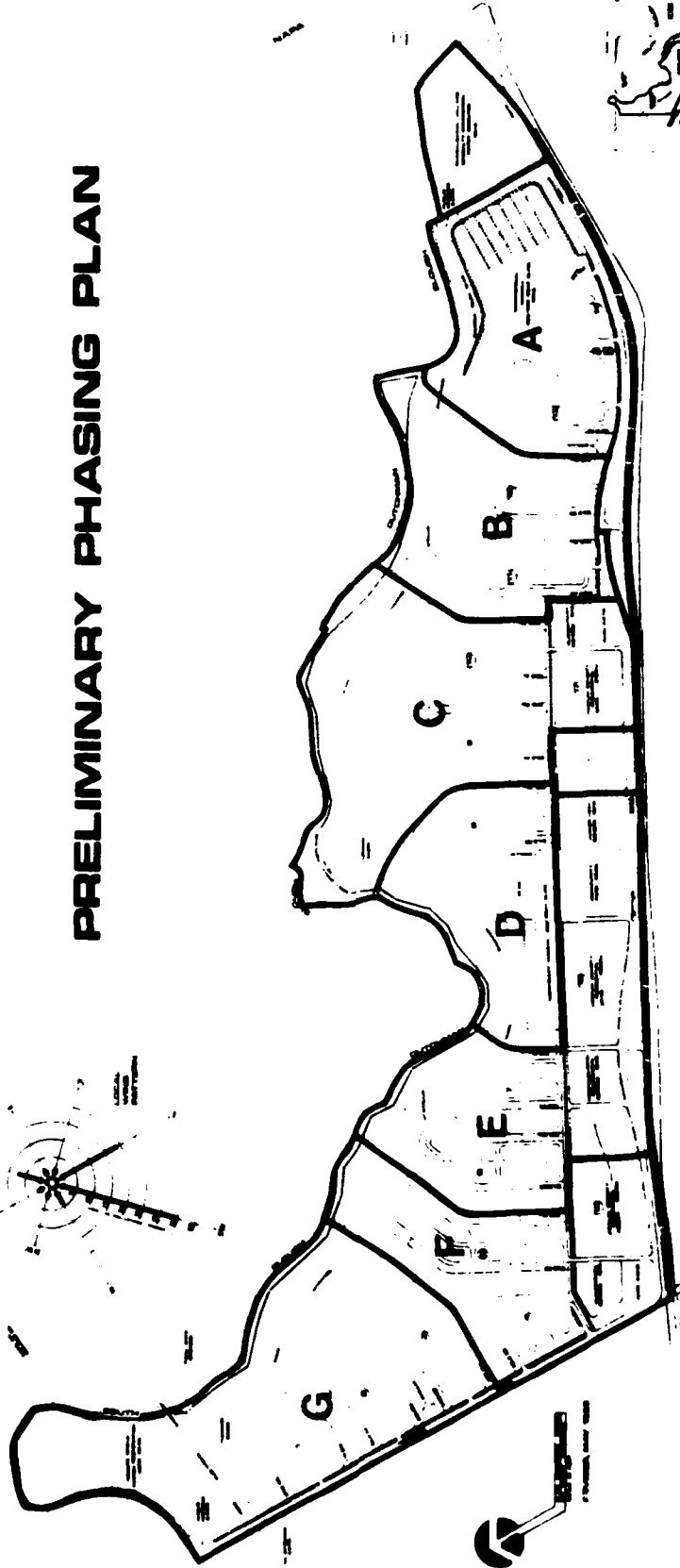
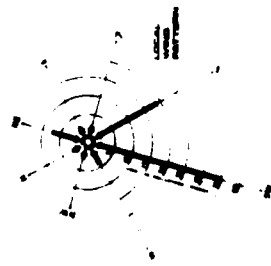


Figure 3

# CULLINAN RANCH • PROPOSED DEVELOPMENT PLAN

David R. H. Co.  
Dallas, Texas  
1977

[illegible]

Handwritten: 1947

**Figure 4**  
**AVERAGE RETENTION TIMES IN STAGE A WATERS**

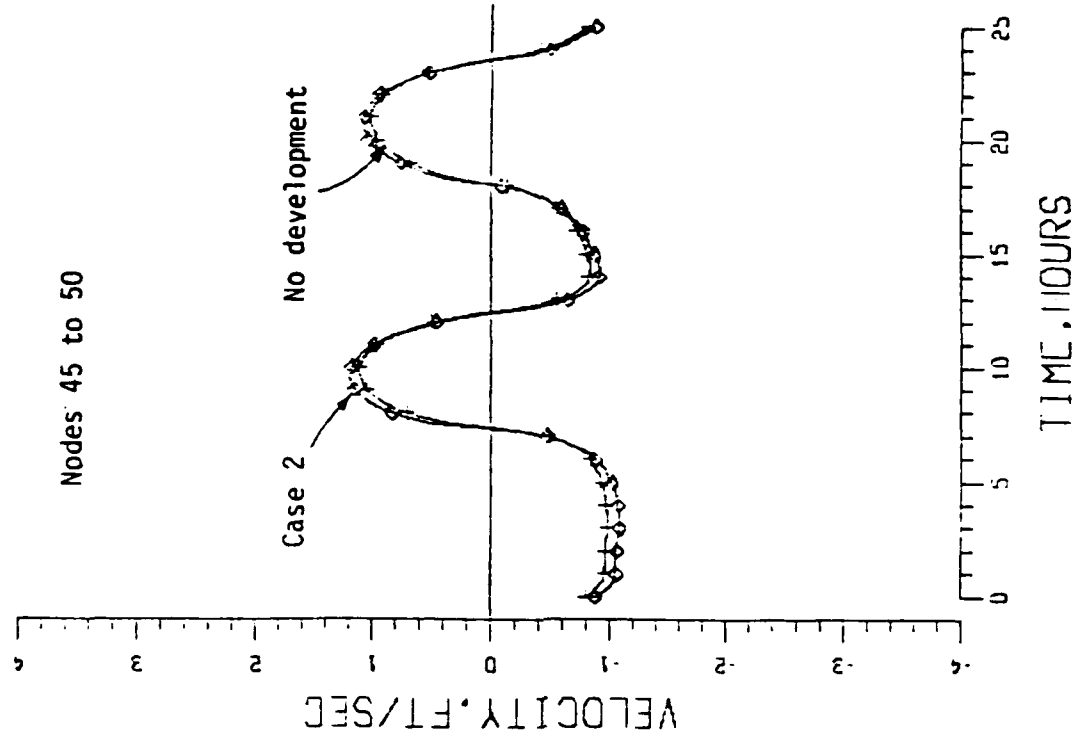
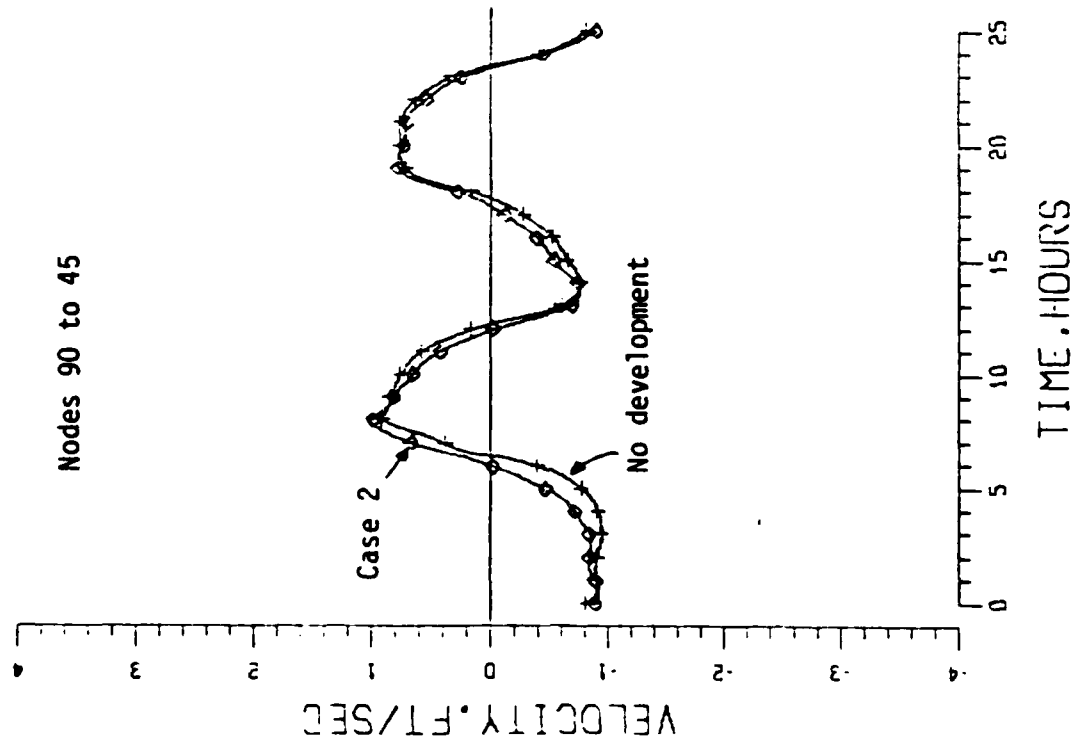


Figure 5

NAPA RIVER TO ENTRANCE

UP-SLOUGH FROM ENTRANCE

CURRENTS IN DUTCHMAN SLOUGH: STAGE A

#### Completion of Stage C, without Tide Gates

Water depths used in this calculation included the effects of sedimentation in the successive stages of the project. Mean lower low water depths used were:

	<u>Main Channel</u>	<u>Laterals</u>
Stage A	27	17
Stage B	28.5	18.5
Stage C	30	20

The average retention times found for this configuration ranged from 6 to 15 days. The pattern of the flushing is presented in Figure 6. This figure shows increasing flushing times with distance from the project entrance with the longest time occurring in the end of the westernmost lateral channel.

Currents in Dutchman Slough between the entrance and Napa River and up-slough from the entrance are presented in Figure 7. Peak currents with the project reach 2 feet per second, a velocity sufficient to maintain the wider channel without maintenance dredging.

There would be negligible effects on the up-slough currents.

#### Completion of Stage C, with a Tide Gate

Conditions used for this model were the same as those in the previous model, except that tide gates that would admit Dutchman Slough waters were placed at the northwest end of the project. The resulting enhancement of residence times is shown in Figure 8. The pattern of average residence times in this figure shows that the increasing residence times in the western most lateral channel found for Stage C in the previous configuration have been eliminated. The average residence times range from 6 to 10 days.

Currents down- and up-slough from the entrance are presented in Figure 9. These currents are nearly the same as those for the previous configuration.

The average discharge through the tide gate during ebb would be 213 cubic feet per second.

#### Completion of Stage D, with Tide Gate remaining in Stage C.

Mean lower low water depths used for modelling this stage of project completion were the following:

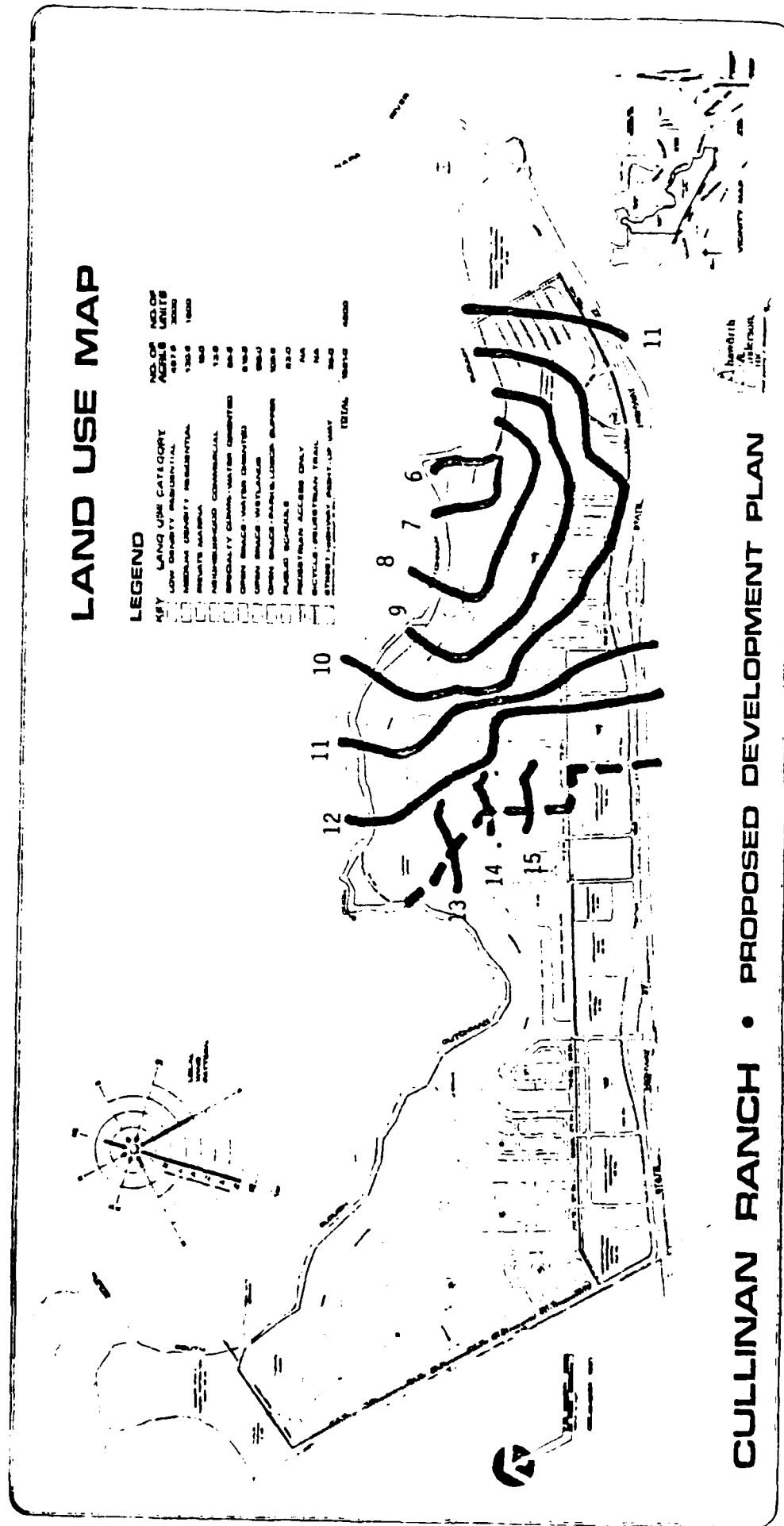


Figure 6

STAGE C WITHOUT TIDE GATES

AVERAGE RETENTION TIMES IN PHASE C WATERS

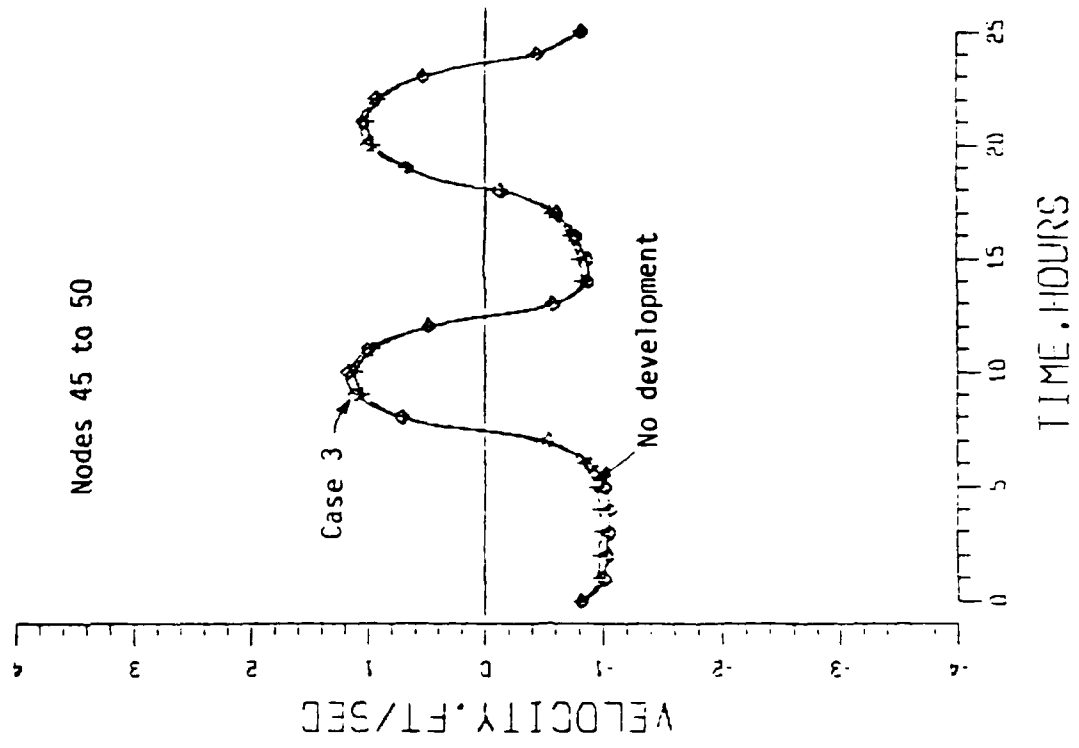
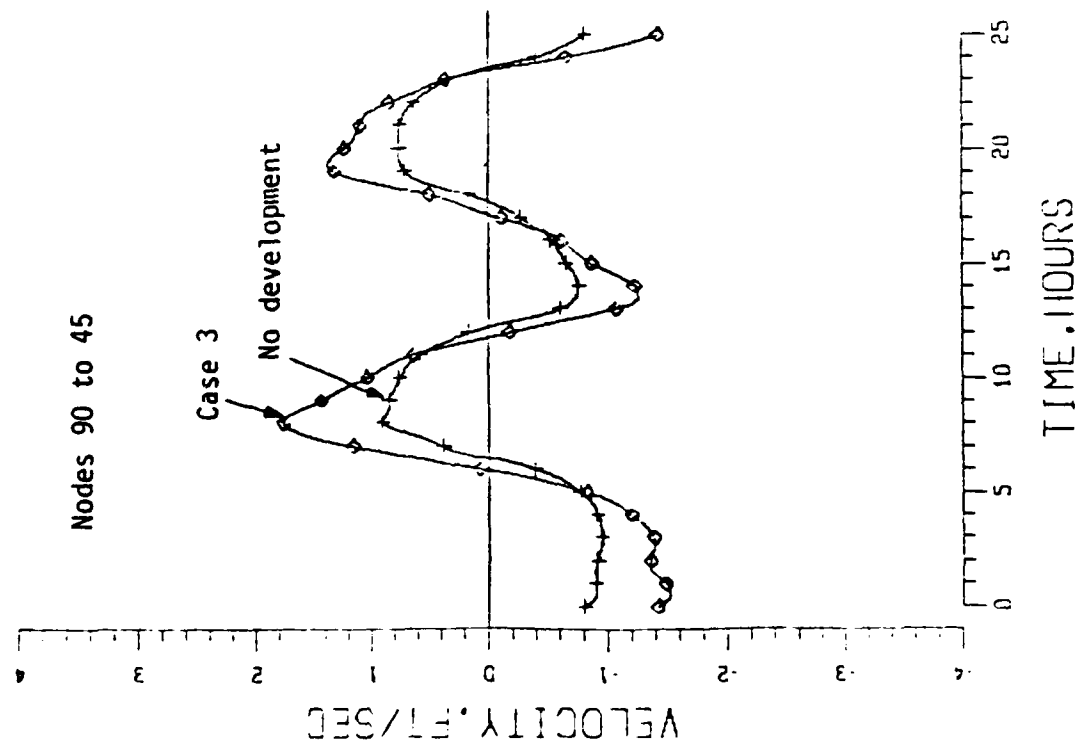


Figure 7

NAPA RIVER TO ENTRANCE

UP-SLOUGH FROM ENTRANCE

CURRENTS IN DUTCHMAN SLOUGH: STAGE C WITHOUT TIDE GATES

# LAND USE MAP

## LEGEND

KEY	LAND USE CATEGORY	NO. OF ACRES	NO. OF UNITS
1	LOW DENSITY RESIDENTIAL	48.9	2000
2	MEDIUM DENSITY RESIDENTIAL	1,311.9	1000
3	INDUSTRIAL	96.0	
4	AGRICULTURAL	13.4	
5	SPECIALTY COMMUNITIES (GOLF COURSE)	88.8	
6	OPEN SPACE - WATER (LAKES)	87.8	
7	OPEN SPACE - WETLANDS	10.0	
8	OPEN SPACE - PRAIRIE	10.0	
9	PUBLIC RIGHTS	9.0	
10	ROADS	1.0	
11	UTILITY RIGHTS	1.0	
12	UTILITY RIGHTS	1.0	
13	UTILITY RIGHTS	1.0	
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100	UTILITY RIGHTS	1.0	
TOTAL		9810	9810

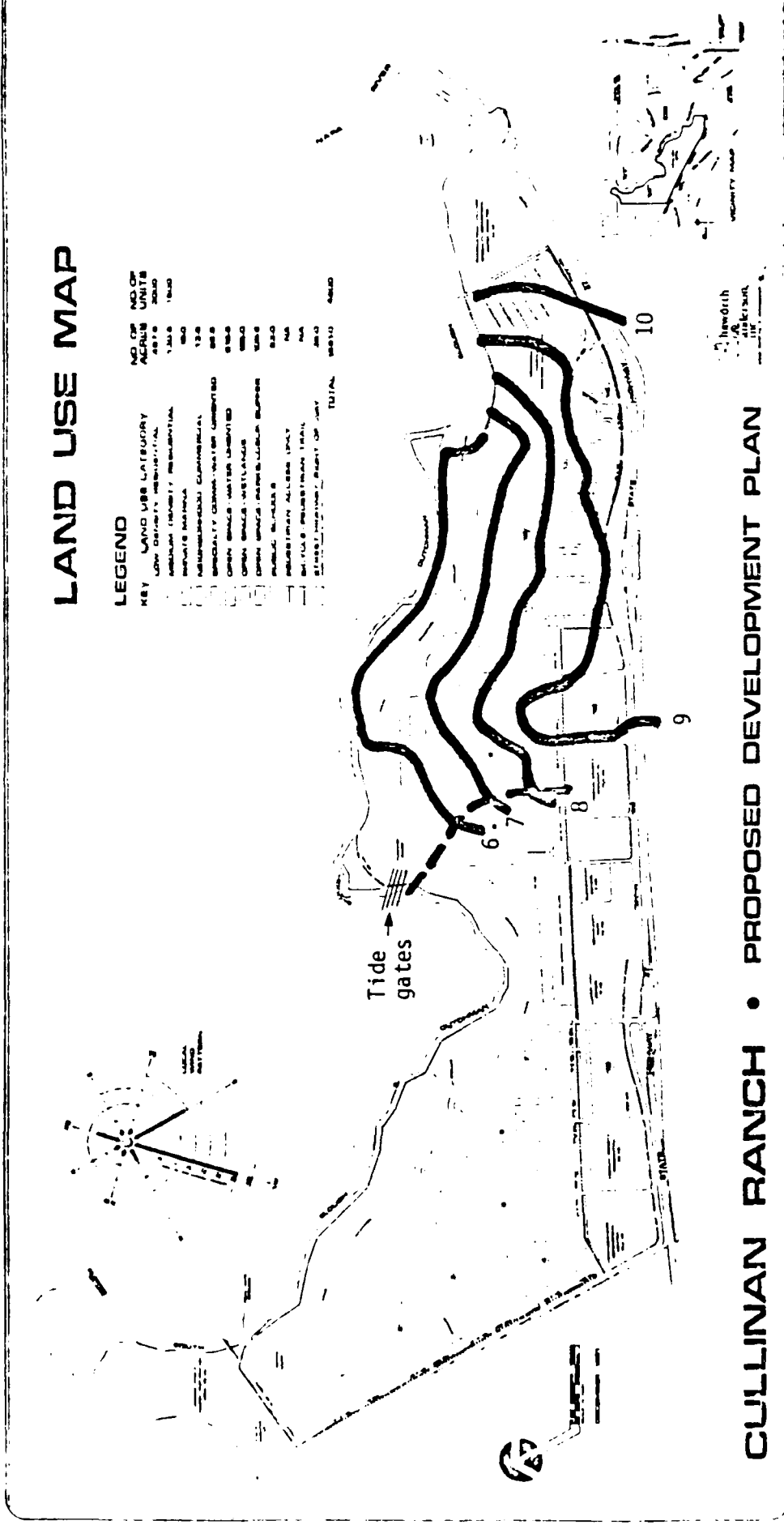


Figure 8  
 STAGE C WITH TIDE GATES  
 AVERAGE RETENTION TIMES IN STAGE C WATERS

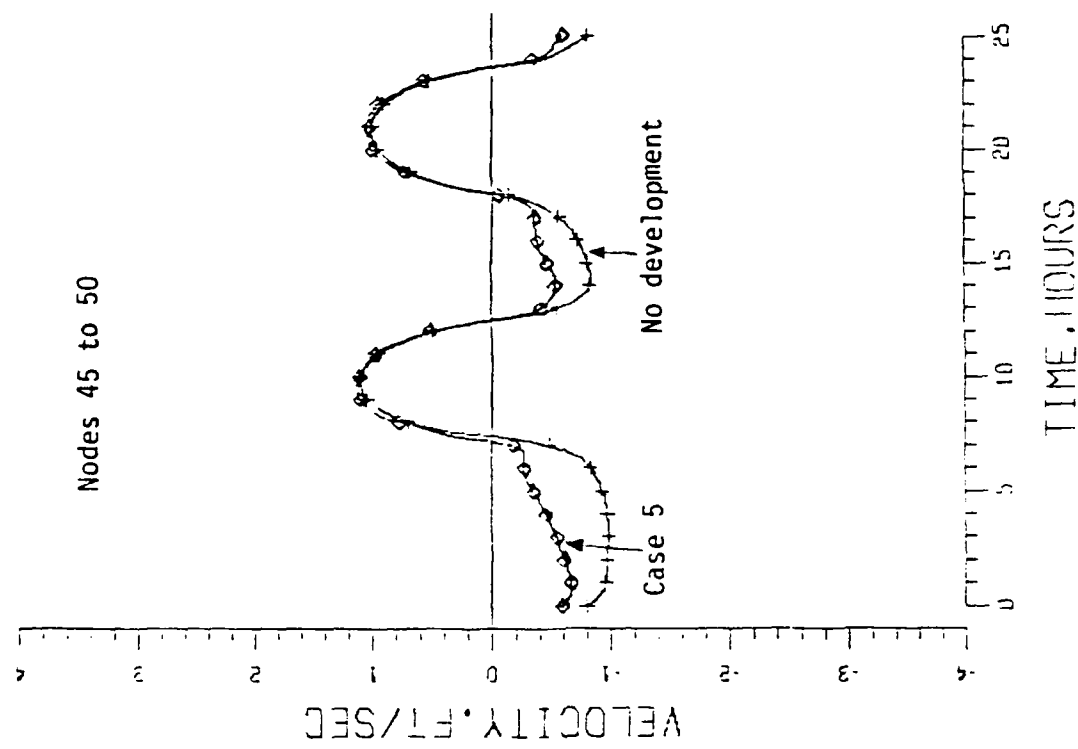
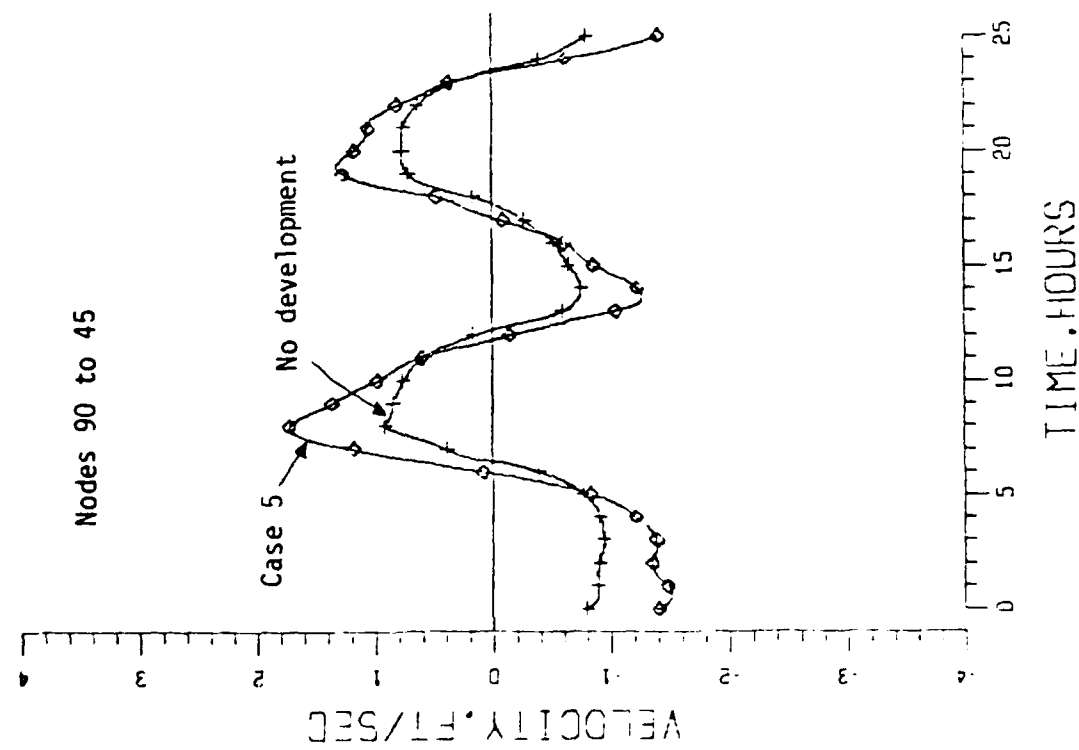


Figure 9

NAPA RIVER TO ENTRANCE

UP-SLOUGH FROM ENTRANCE

CURRENTS IN DUTCHMAN SLOUGH: STAGE C WITH TIDE GATES

	<u>Main Channel</u>	<u>Lateral Channels</u>
Stage A	25.5 ft	15.5 ft
Stage B	27	17
Stage C	28.5	18.5
Stage D	30	20

The very short retention times shown for completion of the project to Stage C with the tide gates installed, and the very short lateral channels in this stage, suggest that it might be feasible to complete Stage D without moving the tide gate. If this is feasible, it would reduce the disturbance to the bank of Dutchman Slough by reducing the number of tide gate installations. This alternative plan was modelled, and the resulting pattern of average residence times is shown in Figure 10. The longest residence time found with this configuration is 11 days.

Currents in Dutchman Slough between the project entrance and Napa River and in the reach up-slough from the entrance are presented in Figure 11. The flood and ebb currents are approximately 2 feet per second--not significantly higher than those of the previous stage.

#### Completion of Stage D, with Tide Gates at west end of Stage D.

For purposes of comparison, Stage D was modelled with the tide gates at its west end. The resulting pattern of average residence times is presented in Figure 12. This figure shows that the average residence times would be reduced from 11 to 5 days at the west end of the project, and that the residence times in the remainder of the project would be reduced slightly. The average flow into the tide gates during ebb would be 259 cubic feet per second.

Currents in Dutchman Slough are shown in Figure 13. They are very close to those in the previous configuration.

#### The Completed Project.

The average retention times in the preceding configurations are very short. The computations for Stage C without and with the tide gates showed that the tide gates would be effective even that close to the project entrance. The computations for Stage D with the tide gates at the west end of that stage showed that the tide gates are even more effective as they are moved up-slough and that the short residence times would be maintained in the previous stages as each stage is added. A model that includes the entire project area is necessary for determining the maximum impact of the project on flows in the surrounding sloughs. A model having the final water depths is also desirable for calculating

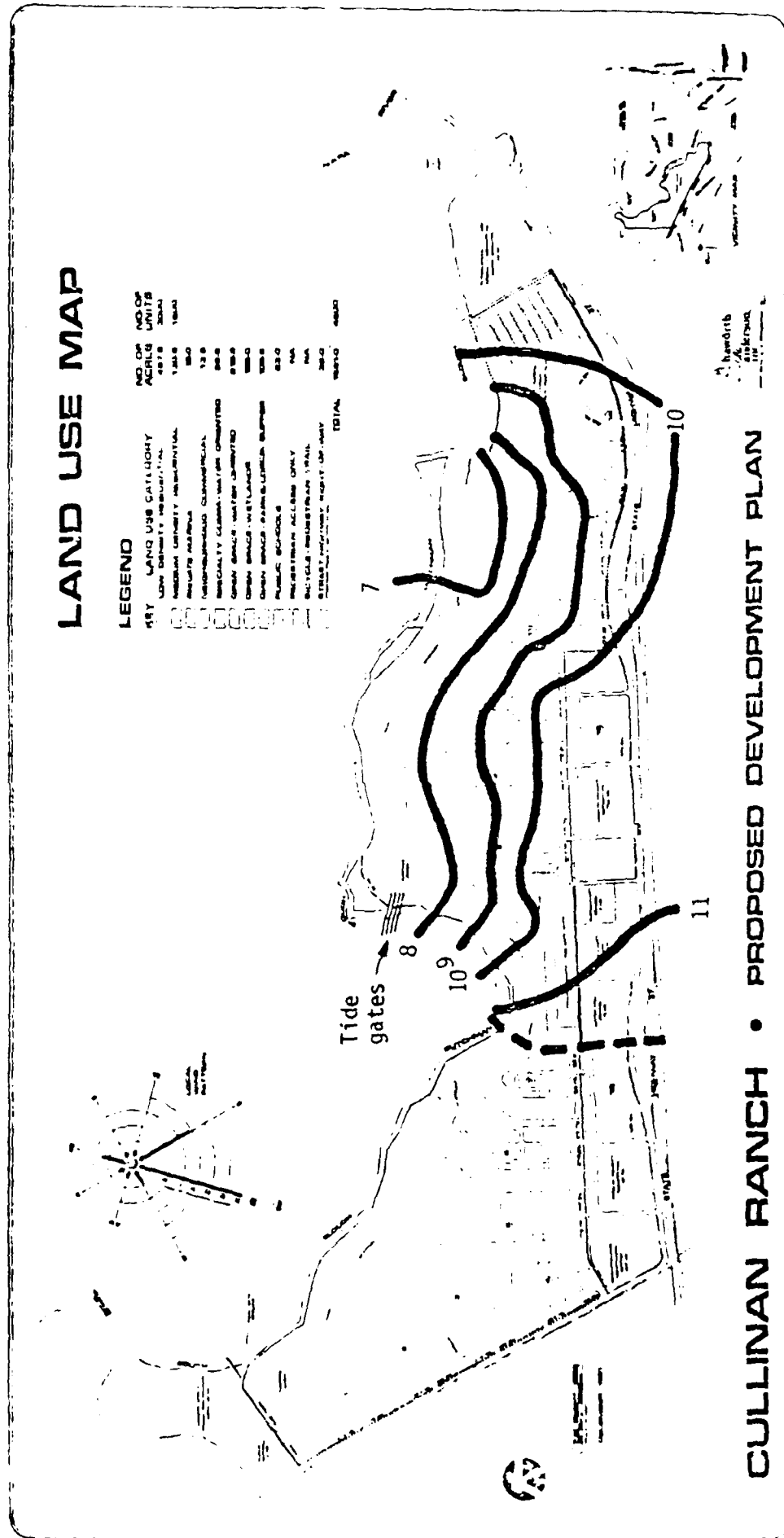


Figure 10

STAGE D WITH TIDE GATES LEFT AT STAGE C LOCATION  
AVERAGE RETENTION TIMES IN STAGE D WATERS

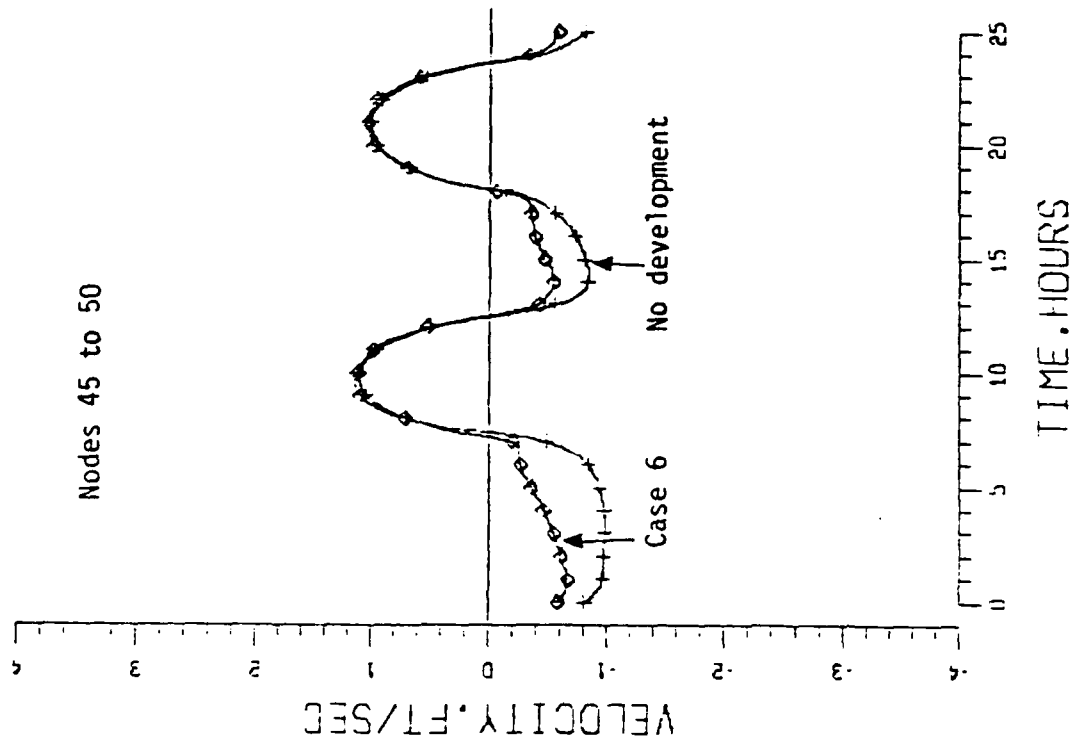
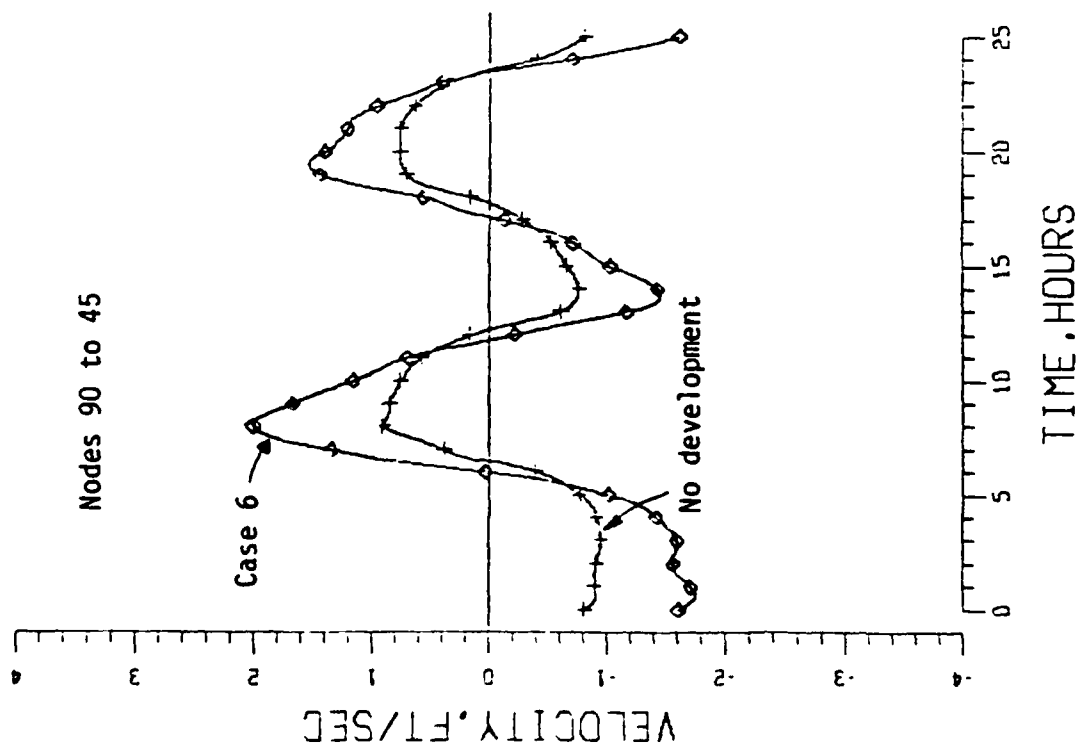


Figure 11

NAPA RIVER TO ENTRANCE

UP-SLOUGH FROM ENTRANCE

CURRENTS IN DUTCHMAN SLOUGH: STAGE D, TIDE GATES AT STAGE C LOCATION



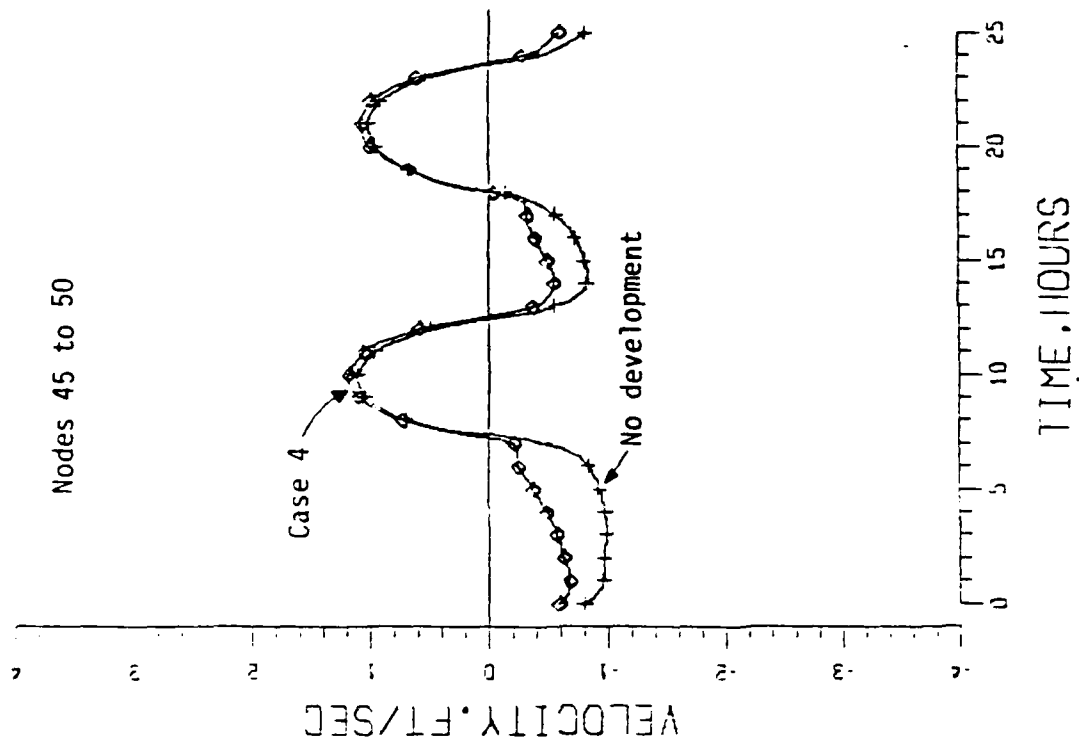
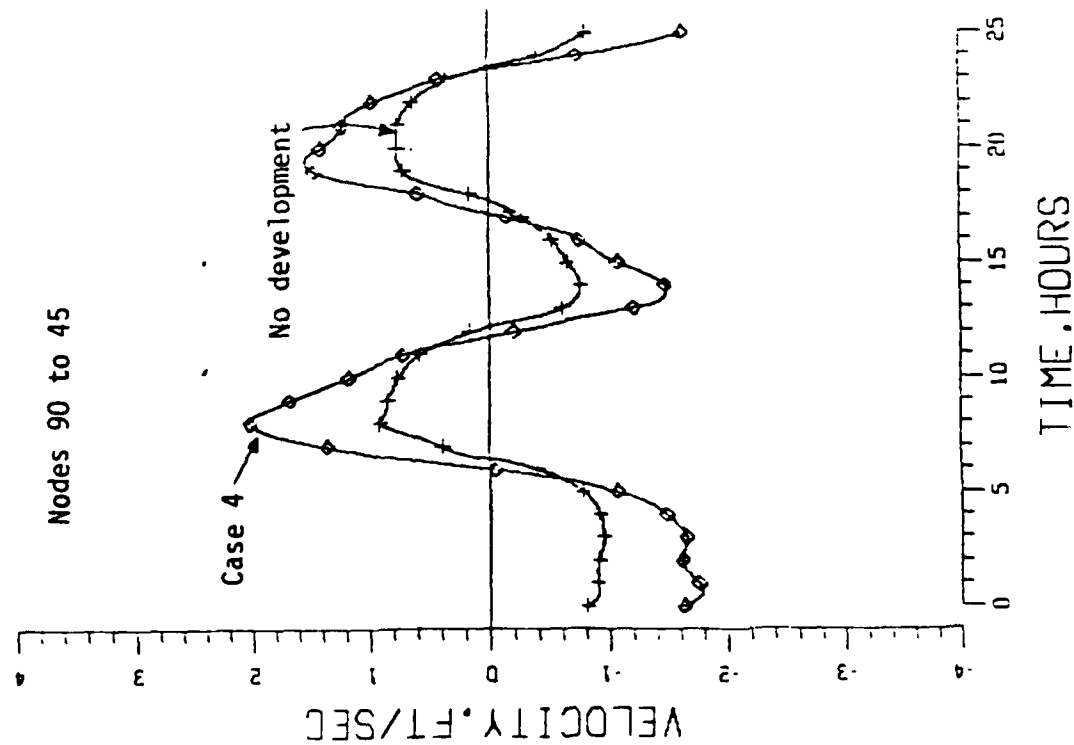


Figure 13

NAPA RIVER TO ENTRANCE

UP-SLOUGH FROM ENTRANCE

CURRENTS IN DUTCHMAN SLOUGH: STAGE D WITH TIDE GATES IN STAGE D

the maximum algae concentrations that are probable. This final model is, therefore, a model of the entire project at ultimate project depths, 10 ft MLLW, and with the tide gates located at the northwest end of the main channel.

Average residence times for this configuration are plotted in Figure 14. This plot shows that the longest residence times at the ends of the lateral channels would be 7 days, and that the longest time, in a corner of the marina, would be 8 days. The average flow through the tide gates during ebb would be 317 cubic feet per second. The project waters would be very well flushed by tidal flows.

Currents in Dutchman Slough between the entrance and Napa River and up-slough from the project entrance are plotted in Figure 15. Peak currents in the lower reach would reach nearly 3 feet per second, which would maintain the water depths, but would not be excessive for boat traffic.

Currents immediately up-slough from the entrance are not much different from those occurring now.

Currents in Dutchman Slough between the tide gates and the north end of the project are shown in Figure 16. The effect of the project in this short reach is to reverse the current during a short portion of ebb. This effect results from the flow of water from the slough through the tide gates. There is very little effect on the flow during flood.

Currents in Dutchman Slough between the north end of the project and its junction with China Slough are also plotted in Figure 16. The effect of the project is a reduction of peak ebb currents from about 1 foot per second to about 0.5 foot per second.

Currents in South Slough in the reach before it joins Dutchman Slough are plotted in Figure 17. This plot shows a small effect during ebb. This effect is also due to flow through the tide gates.

### Discussion

These model studies showed that the most desirable average residence times would be obtained by installing tide gates first in Stage C and moving them to the west end of each successive stage.

The project waters will be an enlargement of the existing slough system. The plots of average residence times throughout the sequence of project stages show that there will be very good water circulation in all parts of the project. The only significant effect of the project on flows in the sloughs is the increased flow in the reach of Dutchman Slough between the project entrance and Napa

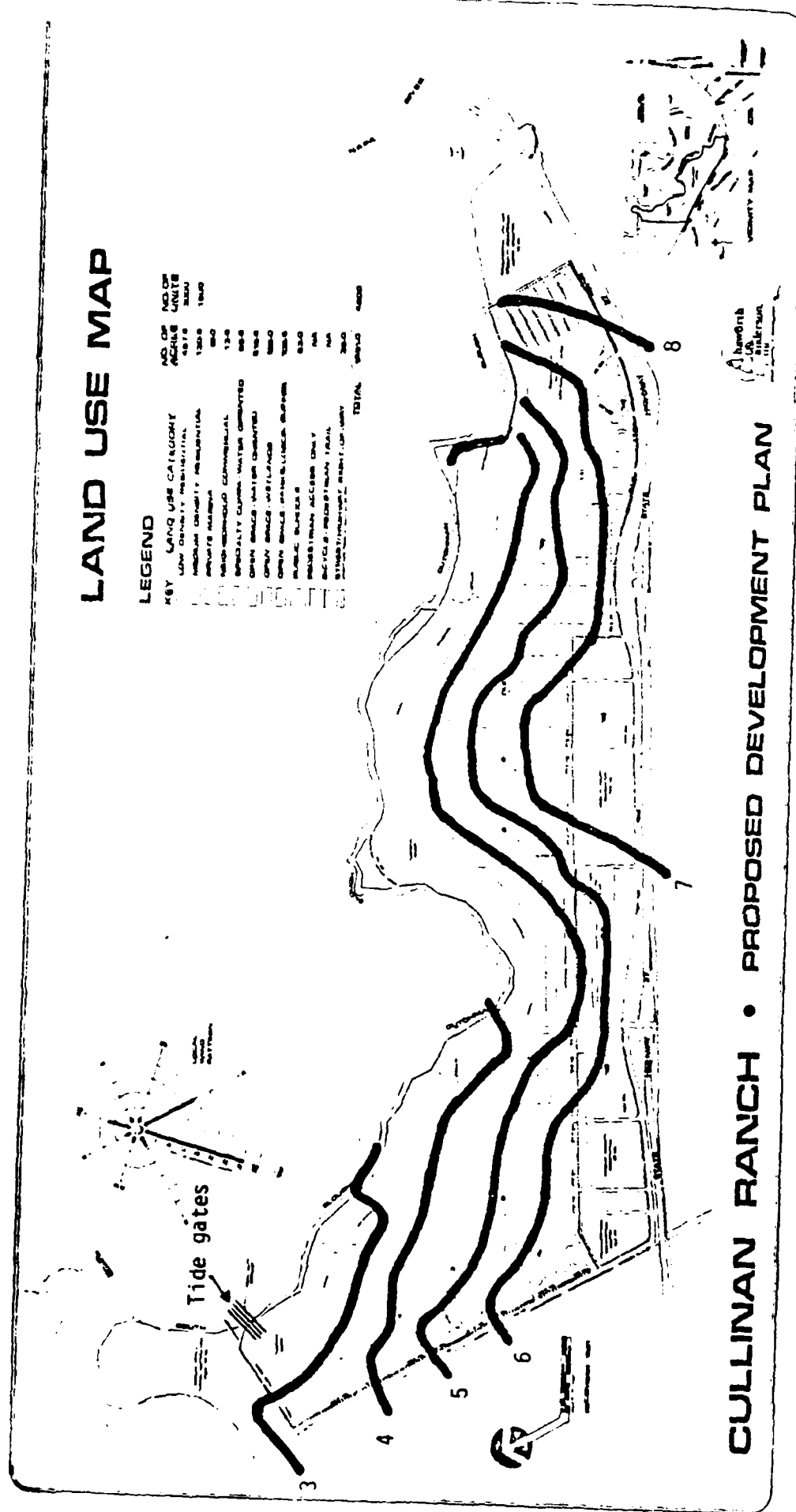


Figure 14  
AVERAGE RESIDENCE TIMES IN THE COMPLETED PROJECT

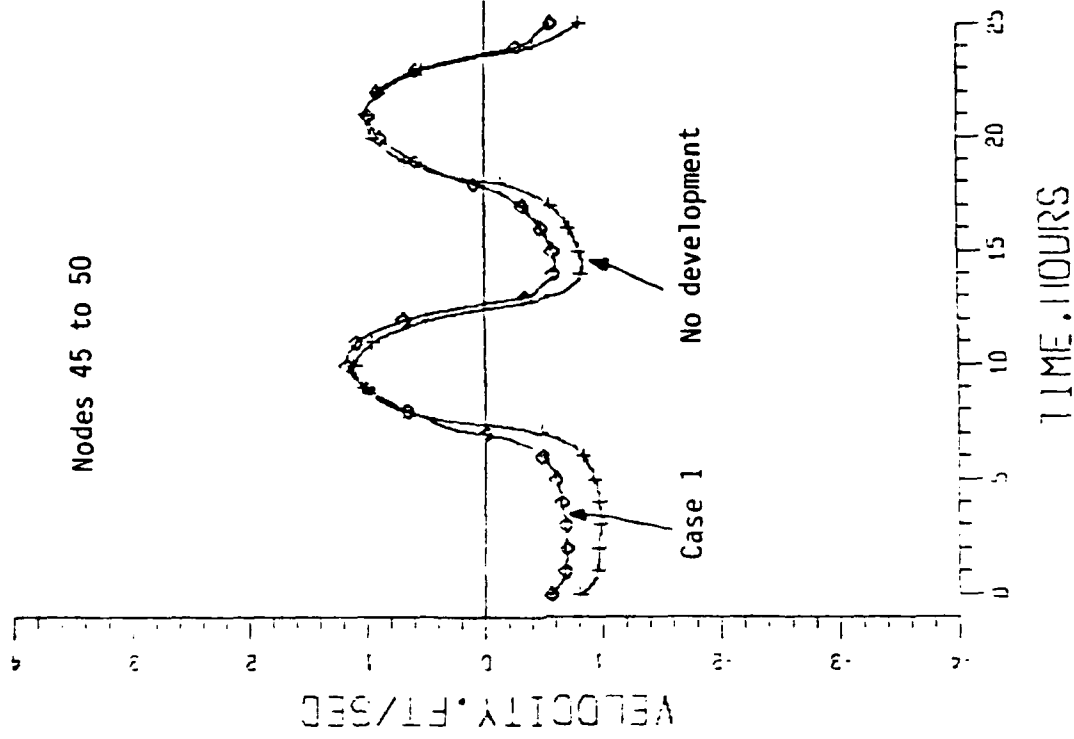
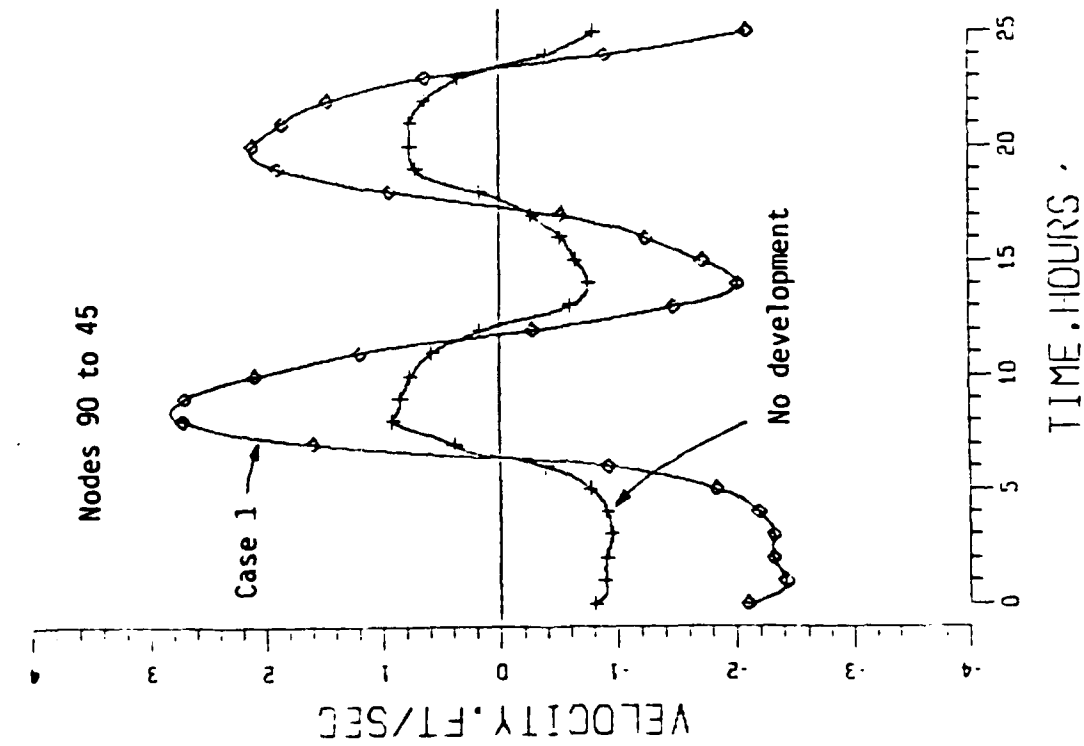


Figure 15

NAPA RIVER TO ENTRANCE

UP-SLOUGH FROM ENTRANCE

CURRENTS IN DUTCHMAN SLOUGH: COMPLETED PROJECT

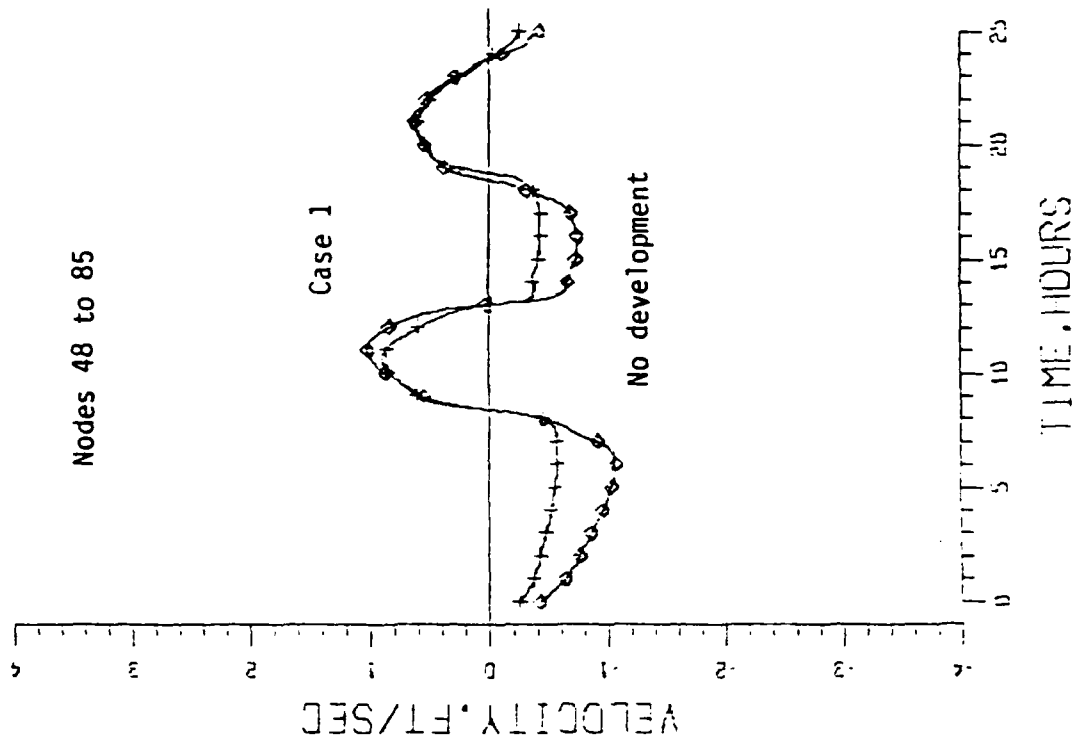
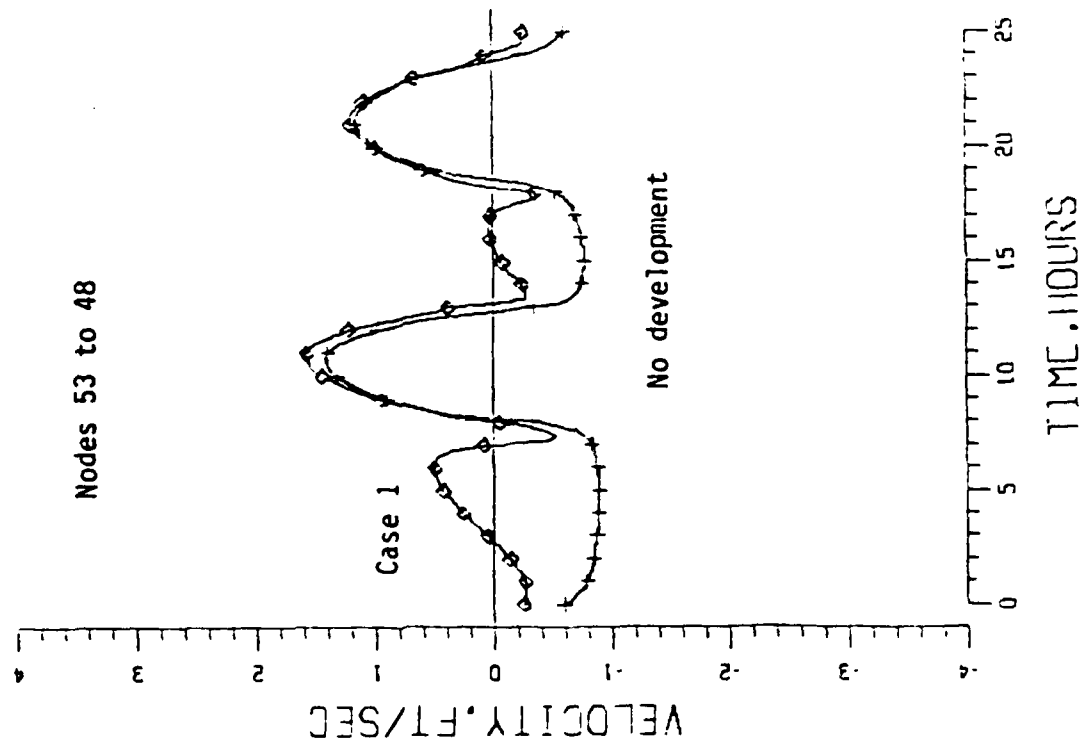


Figure 16  
 SOUTH SLOUGH TO NORTH END OF PROJECT  
 PROJECT TO CHINA SLOUGH  
 CURRENTS IN DUTCHMAN SLOUGH: COMPLETED PROJECT

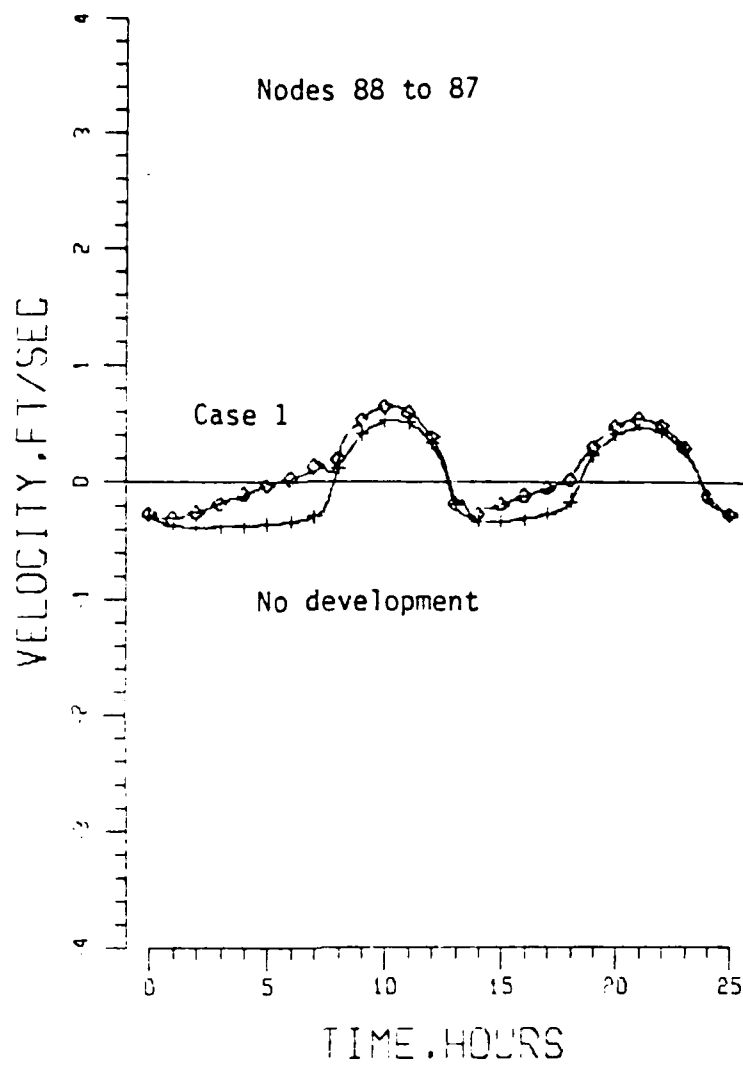


Figure 17

CURRENTS IN SOUTH SLOUGH: COMPLETED PROJECT

River. This increase will assist in maintaining the water depths of the slough.

An appreciation of the short residence times in the Cullinan Ranch project can be had by comparing them with the residence time of another water-oriented development nearby. Bel Marin Keys includes a lagoon that originally had an entrance to Novato Creek. This creek enters San Pablo Bay over mud flats near the mouth of Petaluma River, where suspended sediment concentrations are high. The residents found, after a few years, that the tidal prism of the lagoon created flows in the creek sufficient to keep it scoured to navigable depths, but the sediment carried up from the Bay accumulated inside the entrance to the lagoon. A dam was constructed across the entrance to control this sedimentation. Gates and a lock were included so that once a month during a spring tide the creek channel could be scoured by released flow from the lagoon. This operation typically lowers the water surface in the lagoon 6 feet, and the water surface elevation is recovered by filling during the next few high tides. The average water depth in the lagoon is 18 feet. The average retention time in the lagoon, therefore, is 90 days. Further, the only mixing that occurs is due to the wind and to the monthly discharge and recharge. No reports of water quality problems of any kind in this lagoon have been heard during the 14 years since the dam was installed. Residence times anticipated in the Cullinan Ranch project are very much shorter than those in this lagoon at Bel Marin Keys.

The most prevalent water quality problem in lagoons is an accumulation of algae during summer months. As explained below, such accumulations can be prevented by an adequate combination of flushing and water depths. Shallow lagoons require more flushing than do deeper ones.

## WATER QUALITY

The comments on water quality included concerns about algae concentrations, salinities, dissolved oxygen, land surface runoff, and toxic materials. The following material was prepared to respond to these concerns.

### Anticipated Algae Concentrations

The highest concentrations of algae will occur where the residence time is longest and the depth shallow. As shown above, the longest residence time is 10 days in the marina with a mean lower low water depth of 25 feet. In the final development the longest residence time is 8 days with a mean lower low water depth of 10 feet. The steady state algae concentrations were calculated for these conditions as described in the previous report. The most important of the conditions used for the calculation are that nutrients are sufficient for any level of growth, that the penetration of sunlight is the limiting factor, and that summertime light conditions and temperatures (20 degrees centigrade) prevail. Concentrations of chlorophyll-a in the sloughs was taken to be 10 micrograms per liter. Self-shading was included in the calculation. The results of the calculations for the relevant average retention times and water depths are as follows:

Calculated Chlorophyll-a Concentrations in Cullinan Ranch Waters, micrograms per liter.

Suspended Solids,mg/l	Depth, ft: ART, days:	10 8	20 9	25 10	30 11
10		25	25	18	15
20		12	14	10	8
30		21	9	7	6
40		13	7	6	5
50		10	6	5	4
60		8	5	5	4
70		7	5	4	4

The values shown above demonstrate that increasing the water depth markedly reduces the algae concentrations, even though the average residence times are increased by the increased depth. Most of the values shown are less than that of the slough waters that flush the project. Sedimentation was not included in the calculation. It would reduce the levels of concentration further.

The appropriate means for controlling algae is to maintain adequate water depths and an adequately mixed system. The Cullinan Ranch project is designed

to provide these conditions. No algicide should be used.

### Salinities

The salinities in the Napa River and slough system are described in the EIR/EIS as varying from 0 parts per thousand during winter to a maximum of about 27 parts per thousand in the fall. Monthly measurements during the period October, 1982, to July, 1983, by Harvey and Stanley Associates ranged from less than 1 to 11 ppt. The salinities in the tidal sloughs are determined by that in the Napa River. The salinity drops rapidly there when river runoff increases in winter and rises as the river flow diminishes. During summer months, when Napa River flows nearly cease, the salinities largely depend on fresh water outflows from the delta. During dry years, such as 1976-77, when the minimum fresh water is released, the salinity at Carquinez Strait and in the Napa River will be at its maximum. The current year is an unusually wet one, so that the Harvey and Stanley salinity data describe the lowest salinities that are likely to occur.

The addition of the project waters to the slough system will not alter the salinities in the sloughs or the Napa River.

### Dissolved Oxygen

Factors that affect dissolved oxygen concentrations are discharges of biodegradable substances and photosynthesis and respiration of algae. As shown above, algae concentrations will be maintained at low levels. Discharges of biodegradable wastes will be controlled by sewerage all such wastes and transporting them to the City of Vallejo treatment plant. Pump-out facilities and solid waste repositories are planned for the marina. Monitoring waste disposal, live-aboards, and boat maintenance activities will be conditions specified in the contract with the marina operator. Berthing privileges will be subject to observance of waste management regulations. Successful marina water quality management is a combination of adequate facilities and responsible, effective management.

Discharge of storm drainage to the main channel is planned. The small amount of lawn and garden fertilizer that may be included will not cause nuisance levels of algae growth; this discharge occurs in winter when temperatures are low and turbidity is high, both of which will limit growth. The EIR/EIS notes that nutrient levels are fairly high in the Napa River. "...total nitrogen levels frequently exceeding 1.0 mg-N/l and total phosphorus levels typically between 0.2 and 0.5 mg-P/l." Present levels of algae growth have not caused nuisances because light reduction by the turbidity of the waters limits their growth. Reduction of oxygen levels by the night-time respiration of excessive algae is improbable.

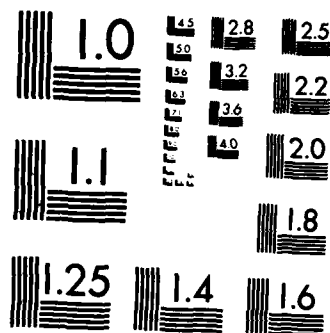
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### Toxic Materials

Toxic materials of concern include fuel spills and small amounts of automotive residues that are carried in street runoff. Fuel management will adhere to the current regulations with regard to installation and the prevention and management of spills.

Street runoff will discharge to the main channel at the ends of the short peninsulas where the most rapid flushing occurs. The numerous discharge points will provide broad initial distribution. Most dissolved toxic materials, such as heavy metals and pesticides, are quickly sorbed onto suspended sediment particles. When these eventually deposit and are buried by subsequent deposition the sorbed materials are removed from the active system.

### Maintenance of Water Quality

A water quality monitoring program is in the detailed planning stages. As presently envisaged, the monitoring will include monthly sampling at locations most likely to be affected and analysis of the samples for dissolved oxygen, biochemical oxygen demand, and chlorophyll-a. Unforeseen water quality problems should appear during the first stage of development, so that corrections can be applied to subsequent stages if needed.

### Erosion Control

Control of erosion during construction will include conducting all feasible construction on dry land, and admitting slough waters after the channels and basins are completed. This way the erosion is limited to the opening of the stage, when the waters flow into the newly completed work. The amount of erosion will be minimized and transitory, and the eroded material will largely deposit inside the project.

Excavation under water will be done by clamshell or by suction dredge discharging into a closed pond. Neither of these operations should cause significant increases in suspended solids.

Erosion of banks by waves is the most significant source of suspended solids in the project. Bank protection by rip-rap, bulkheads, or by plants will be necessary to control bank erosion.

As described in the report, WATER CIRCULATION, SEDIMENTATION, AND ALGAE GROWTH IN THE CULLINAN RANCH PROJECT, management of dredged material will include batch sedimentation in especially designed ponds or excavations at the north end of the development, decanting the clear water to

Dutchman Slough, allowing the sediment to dry, and either accumulating it or using it for construction and levee maintenance. It is planned that the decanting operation will take place during hours when the wind is slight, such as at night or during early morning hours so that waves do not suspend the deposited material. The batch mode facilitates control of the discharge, and decanting can be limited to the times that the suspended solids are acceptably low.

Water quality management is an ongoing endeavor. It will require attention of the organization that will be responsible for the maintenance of the development and education of the residents and boat owners. It is important at this stage to anticipate the needs for water quality management and to provide facilities that will most assure effective management.

## EFFECTS OF CULLINAN RANCH ON DUTCHMAN SLOUGH

The hydraulic model studies showed that the effects of the project on flows in the sloughs is slight except for the reach of Dutchman Slough between the project entrance and Napa River. The higher currents that will occur as the project develops will erode the bed of the channel until the enlarging cross-section has reduced velocities to the point where further erosion ceases. Higher currents will occur during both flood and ebb, so that about half of the eroded bed material will be carried into the project, and half will be carried to the Napa River where it will rejoin the overall sediment circulation. It was noted in the earlier report that the larger volume of water that flowed through Dutchman Slough during the ebb and flood of the tides before the salt pond areas were diked maintained a larger cross-section than the present one. The effect of the project on the channel will be toward restoration of that cross-section.

It will be necessary to disturb the bank to install the tide gates. This disturbance will be local and temporary and vegetation will re-establish itself after installation as it has on the dike since it was constructed.

Flows through the tide gates will be out of the slough and into the project only. Such flows will cause little disturbance to the bed or bank of the slough.

## DISPOSAL OF DREDGED SEDIMENT

Comments about the disposal of dredged sediment include concern about the increased amount due to the enlarged channels and concern about drying the material after decanting.

Since the original study of sedimentation was completed, the plans of the cross-sections of the project channels have been changed. The depths of the channels have been increased to the maximum obtainable with a 1:4 slope. The maximum depths now planned are 30 feet MLLW in the main channel and 20 feet MLLW in the lateral channels. This increase will provide additional material for constructing the developed areas and will provide sufficient volume to store the sediment that will accumulate during the first 42 years of the project life, according to our best estimate.

The sediment processing facilities described in the earlier report were 1.4 times the size required for the project, according to the estimated sedimentation rate. The current plan has about 1.6 times the water area of the earlier configuration. Modification of the plan for the processing facilities does not appear to be warranted at this time.

It was pointed out in the comments that dredged clayey sediments are difficult to dry. As the mud surface dries it becomes less permeable to the moisture below, and the rate of drying diminishes. There are two means of coping with this problem. One is to make the deposit thin. That is the approach used in the plan. The thickness of the dried layer would average 6.6 inches. The second means is to mechanically break the crust with a disc or harrow. This method requires energy and is expensive, but it can be used to accelerate the drying.

The present plan envisions placing the drying facilities at the bottom of a 30 foot excavation. If the dried material is consolidated in place the life depends on the final elevation of the top of the material. A 6 foot MLLW top elevation would provide storage for 43 years. The total capacity of the project, including storage in the channels, would then be 85 years. If the dried sediment is removed and used for levee repair or fill, the life of the disposal facilities is infinite.

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